№112/2026

Znanstvena misel journal

The journal is registered and published in Slovenia.

ISSN 3124-1123

VOL.1

The frequency of publication – 12 times per year.

Journal is published in Slovenian, English, Polish, Russian, Ukrainian.

The format of the journal is A4, coated paper, matte laminated cover.

All articles are reviewed

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CHEMISTRY

STUDY OF THE PROCESS OF PRELIMINARY AROMATIZATION OF REFORMING FEEDSTOCK ON A ZEOLITE-CONTAINING CATALYST

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Abstract

Due to the growth in automobile gasoline consumption, the reduction of global oil reserves, and the continuous introduction of new requirements for the quality of motor fuels and their chemical composition, great attention is paid to improving catalytic reforming technologies [5]. The efficiency of the reforming process as a whole can be increased through the development and implementation of new catalysts, as well as through the improvement of technological equipment and process schemes. A zeolite-containing catalyst was used as the object of the study. The further direction of research was determined — the selection of optimal operating parameters for a zeolite-containing dehydrocyclooligomerization catalyst under the conditions of the preliminary aromatization process of reforming feedstock. All processes were carried out in the temperature range of 300–400 °C, at a pressure of 1 MPa, with a volumetric feed rate from 1 h^{-1} to 4 h^{-1}. The highest content of aromatic hydrocarbons was recorded in samples obtained at temperatures of 350 °C and 375 °C — 18.7 vol.% and 17.9 vol.% respectively, which corresponds to an increase of 7.9 wt.% and 7.1 wt.% compared to the feedstock. The difference in aromatic hydrocarbon content between samples obtained at volumetric feed rates of 1 h^{-1} and 4 h^{-1} is relatively small and amounts to 2.1 vol.%.

Keywords: reforming, catalyst, aromatization, arenes, process temperature.

Introduction

One of the most crucial procedures in the contemporary petrochemical and oil refining industries is catalytic reforming. Catalytic reforming has two main purposes: 1) production of aromatic hydrocarbons — benzene, toluene, and xylenes; 2) production of high-octane components of automotive gasolines.

Hydrogen-rich gas, which has a high hydrogen content and is frequently utilized in hydrogenation operations, is another important byproduct of the catalytic reforming process.

According to recent data, the total global capacity of the reforming process is about 14 million barrels per day (600 million tons per year), of which two-thirds operate in the gasoline mode for the production of high-octane gasoline components, and one-third operate in the aromatic mode for the production of individual aromatic hydrocarbons [7].

At present, 51 catalytic reforming units with a total capacity of about 30 million tons per year are operating at Russian oil refineries. Of these, 45 units with a total capacity of 27 million tons per year operate in the gasoline mode, and 6 units operate in the aromatic mode (3 million tons per year) [7].

In Russia, the development of reforming technology is carried out in three main directions.

- optimization of technological operating conditions in order to increase process severity and the yield of target products;
- modernization of existing catalysts and development of completely new catalysts;
- improvement of technological flow schemes in order to increase the octane number without reducing the yield of target products, as well as reducing the content of aromatic hydrocarbons in reformate [1].

The majority of catalytic reforming units in Russia were built during the Soviet period. Due to the long service life of these units, reconstruction and modernization require significant capital investments. Therefore, at present, a more economically feasible option is the development and implementation of new catalysts.

Bifunctional catalysts are used in the catalytic reforming process. At the initial stage of industrial development of catalytic reforming, oxide catalysts or alumina–molybdenum catalysts were mainly used. Later, platinum catalysts were introduced, which gave a strong impetus to the development of the catalytic reforming process.

The high cost of platinum predetermined its low content in the catalyst and led to the subsequent creation of platinum–rhenium catalysts. In such catalysts, the platinum content ranges from 0.3 to 0.7 wt.% [2; 6].

Over time, a decrease in catalyst activity occurs. This is associated with coke deposition on the catalyst surface, as well as with a reduction in platinum dispersion, since the accumulation of poisons takes place, which cannot be removed.

To restore activity, a regeneration process is applied; however, even after regeneration, the catalyst does not fully recover its initial activity, which ultimately leads to the need for catalyst replacement over time.

A specific feature of considering the use of zeolite-containing catalysts is that their application in the catalytic reforming process makes it possible to reduce the process temperature. Process temperature affects catalyst activity, which in turn determines the duration of the regeneration cycle.

A short regeneration cycle is characterized by frequent process shutdowns and, consequently, interruption of product output, as well as increased costs for catalyst regeneration [4].

A catalytic system using a zeolite-containing catalyst for low-temperature reforming is presented in [9]. The authors developed a catalytic system consisting of three reactors connected in series. The first reactor contains a catalyst with an AEL-structure zeolite, while the second and third reactors contain a catalyst with an LTL-structure zeolite.

Results Obtained

The advantages of using zeolite-containing catalysts lie in their low cost and the possibility of their application in processes for producing motor fuels from wide fractions of hydrocarbon feedstock without preliminary treatment.

It is known that, in addition to the dehydrogenation of cycloalkanes, the formation of aromatic hydrocarbons in the reforming process occurs as a result of alkane dehydrocyclization [102]. However, in the tail reactors, linear and iso-alkanes enter hydrocracking reactions at a significant rate, which contribute to an increase in the octane number of reformate due to the concentration of arenes, while simultaneously reducing the overall reformate yield. The involvement of C7–C10 alkanes in aromatic formation reactions makes it possible to optimally utilize the feedstock potential and increase the overall efficiency of the process.

A catalyst containing zeolite was selected as the subject of the investigation. The experiments were performed at temperatures between 300 and 400 °C, under a pressure of 1 MPa, with a volumetric feed rate of 1 h^{-1}.

It was established that the use of a zeolite-containing catalyst in the gasoline aromatization process promotes the formation of arenes from alkanes, without significantly affecting hydrocarbons of cyclic structure — the maximum reduction in cycloalkane content is 4.6 wt.%.

The change in aromatic hydrocarbon content with increasing temperature in the feedstock and gasoline aromatization products on a zeolite catalyst is shown in Figure 1.

The highest content of aromatic hydrocarbons was recorded in samples obtained at temperatures of 350 °C and 375 °C — 18.7 vol.% and 17.9 vol.% respectively, which corresponds to an increase of 7.9 wt.% and 7.1 wt.% compared to the feedstock.

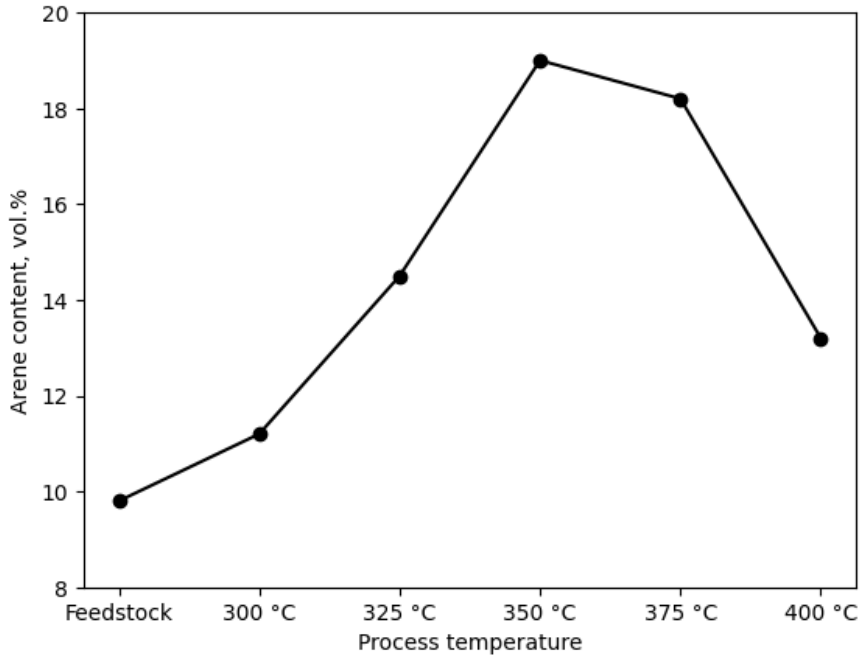

Figure 1. *Change in the content of aromatic hydrocarbons with increasing temperature in the feedstock and gasoline aromatization products on a zeolite-containing catalyst*

Figure 2 shows the hydrocarbon composition of the feedstock and gasoline aromatization products on a zeolite-containing catalyst.

- alkanes,
- isoalkanes,
- cycloalkanes,
- arenes,
- alkenes.

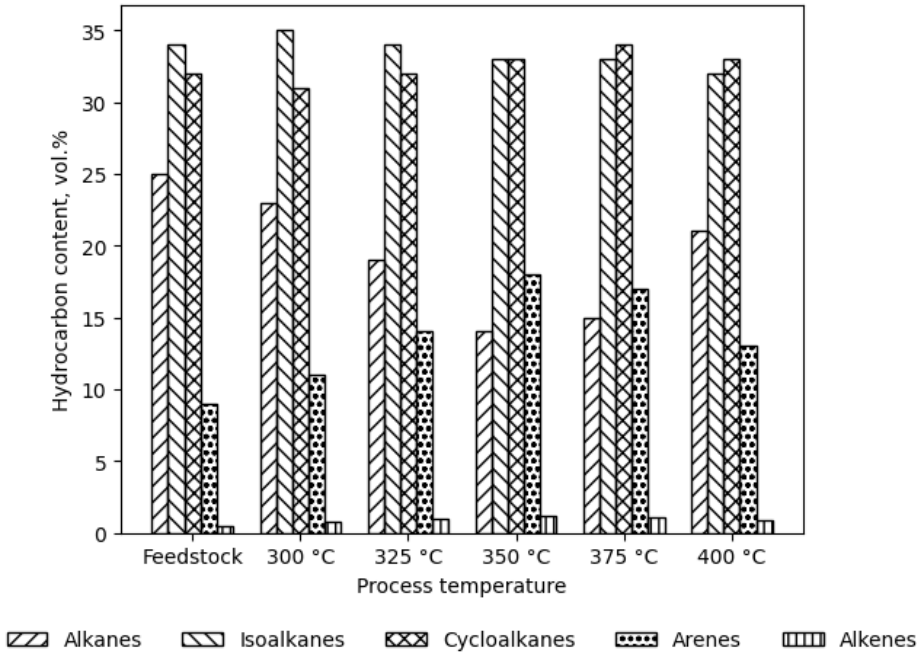

Figure 2. *Hydrocarbon composition of the feedstock and gasoline aromatization products on a zeolite-containing catalyst*

The assumption of selectivity of the zeolite-containing catalyst toward linear alkanes is confirmed by a decrease in their content by 12.3 wt.% and 11.0 wt.%.

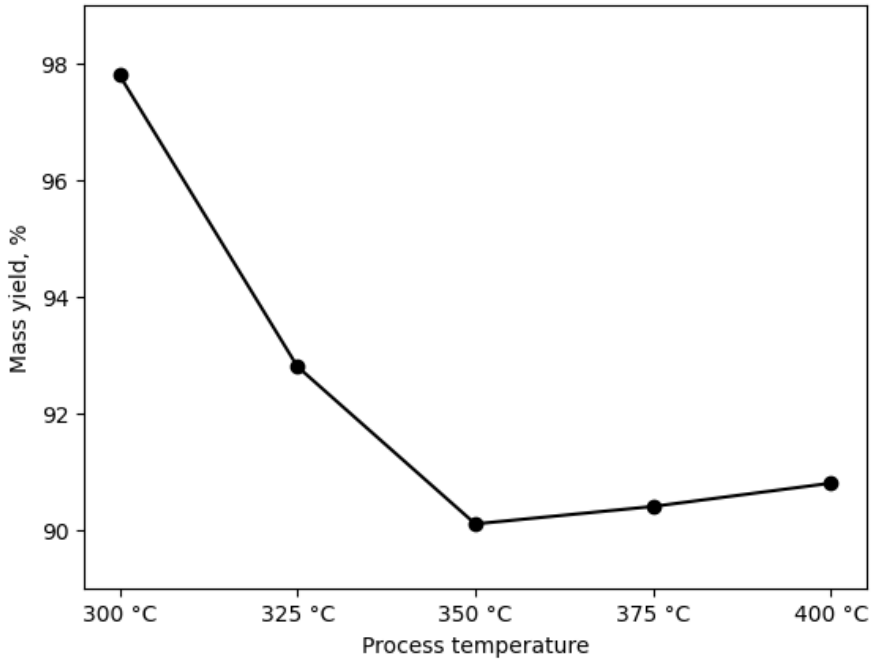

Figure 3. *Change in the yield of gasoline aromatization products on catalyst 4 with increasing temperature*

A decrease in the catalyst yield when the process temperature is increased to 400 °C, along with a relative reduction in the share of arenes in liquid products compared to catalysts obtained at lower temperatures, is presumably a consequence of intensified hydrocracking reactions. The yield of liquid products decreases from 97.8 wt.% to 90.1 wt.% when the temperature reaches 350 °C, and with further temperature increase changes insignificantly.

Further, to evaluate the influence of the listed factors on the efficiency of using a zeolite-containing catalyst in the gasoline aromatization process, experiments were carried out in which the volumetric feed rate was maintained from 1 h^{-1} to 4 h^{-1}. The initial process temperature was 300 °C and was increased, at intervals of 25 °C, up to 400 °C (Figures 4–6) [8].

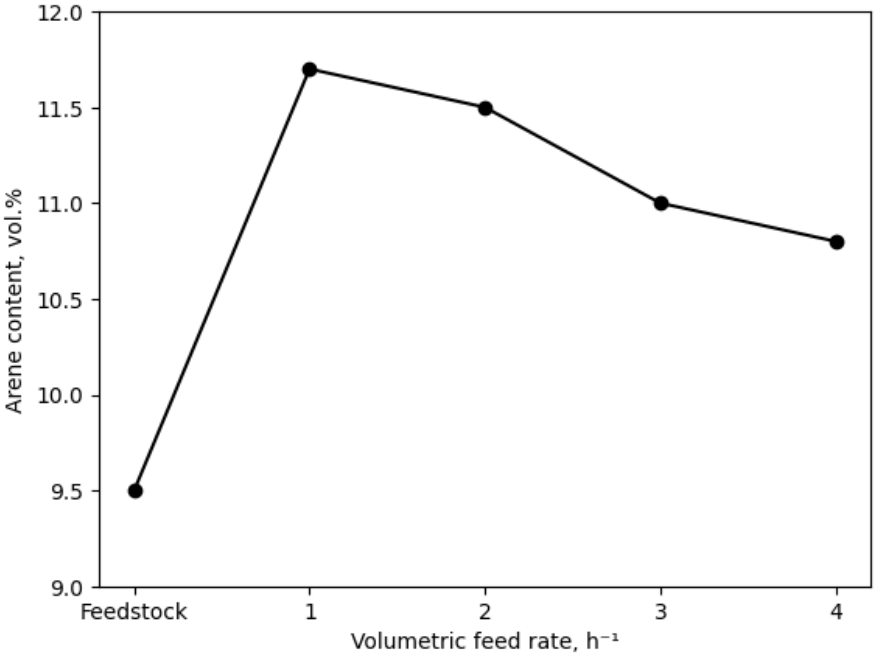

Figure 4. *Dependence of arene content in gasoline aromatization products on a zeolite-containing catalyst on the volumetric feed rate (t = 300 °C)*

It was established that at a temperature of 300 °C, in the presence of hydrogen-containing gas, the content of aromatic hydrocarbons decreases with an increase in volumetric feed rate from 11.8 vol.% to 10.8 vol.%. The increase in arene content compared to the feedstock under these experimental conditions is insignificant — from 1.1 wt.% to 1.7 wt.%, depending on the volumetric feed rate.

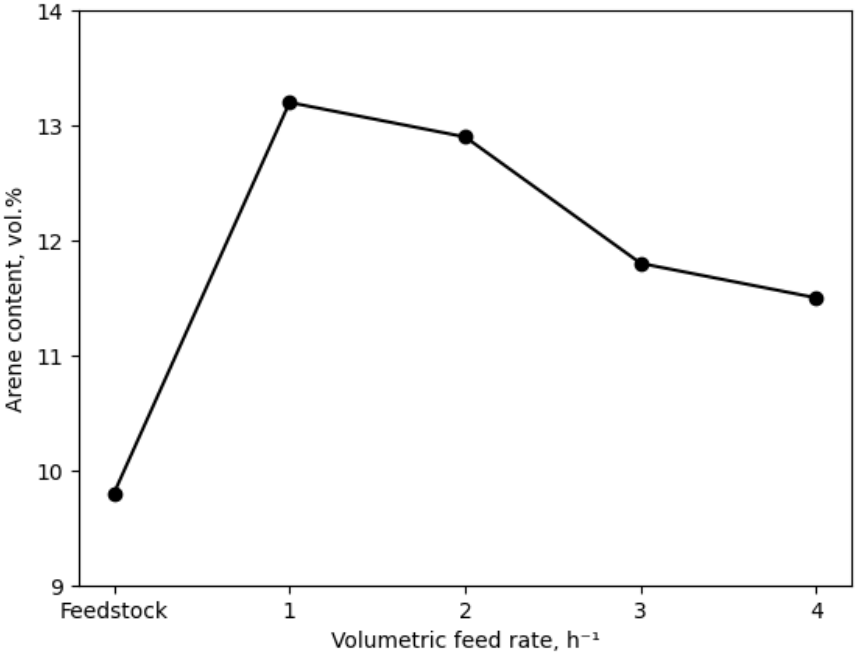

Figure 5. *Dependence of aromatic hydrocarbon content in gasoline aromatization products on catalyst 4 on the volumetric feed rate (t = 350 °C)*

It was determined that the arene content in process products decreases with increasing volumetric feed rate from 1 h^{-1} to 4 h^{-1} from 13.2 vol.% to 11.3 vol.%.

Within the framework of the experiment, the highest amount of aromatic hydrocarbons was recorded in process products obtained at a temperature of 400 °C. The process products obtained in the volumetric feed rate range from 1 h^{-1} to 4 h^{-1} contain from 14.1 vol.% to 16.2 vol.% of aromatic hydrocarbons. At the same time, the maximum increase in arene content compared to the feedstock is 5.4 wt.%.

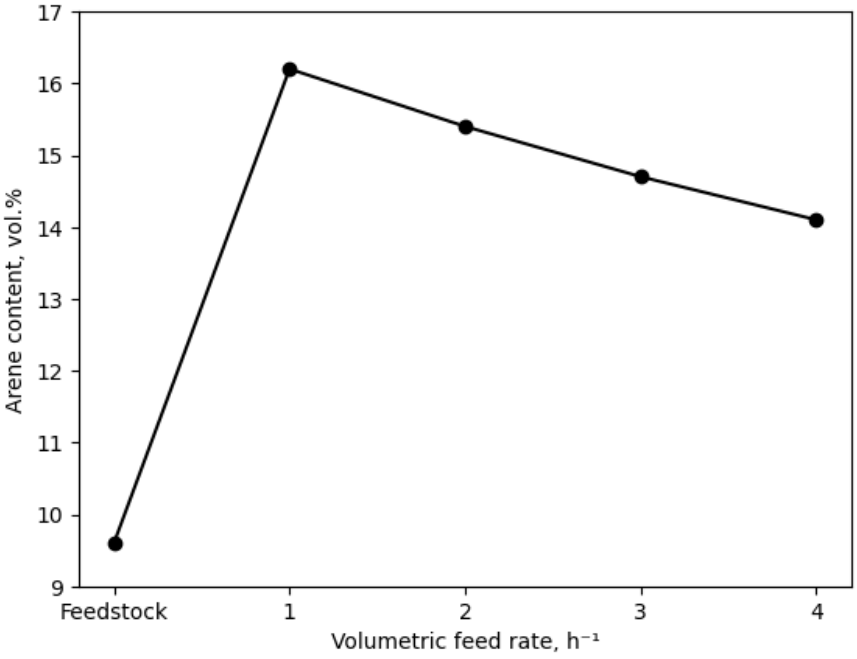

Figure 6. Dependence of aromatic hydrocarbon content in gasoline aromatization products on catalyst 4 on the volumetric feed rate (t = 400 °C)

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PROCESSING OF ALMOND SHELLS INTO ACTIVATED CARBON

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Abstract

In recent years, almonds have become an important fruit crop in Azerbaijan, producing high yields. Almond shells (AS) are an efficient and cost-effective raw material for producing activated carbon (AC) suitable for CO_2 capture. This study examines the effects of carbonization temperature and alkali activation on the porous structure of AC derived from almond shells. Specific surface area (BET), pore volume, pore width, and micropore size distribution were analyzed. Optimal conditions were identified as KOH thermochemical activation with single-stage carbonization at 800–900 °C and carbon/KOH ratios of 1:2 and 1:3. Micropores in the 0.6–0.7 nm range provided high CO_2 adsorption capacity, demonstrating the potential of fruit-processing waste for effective carbon adsorbent production.

Keywords: waste, almond shell, adsorbents, carbon dioxide, activation, micropores.

Introduction

Climate change and global warming are among the most critical environmental challenges facing our planet. Carbon dioxide, produced from the combustion of fossil fuels, is one of the main contributors to the greenhouse effect. In 2015, the governments of many countries ratified the Paris Agreement, committing to reduce greenhouse gas emissions by the end of this century [1–7]. Activated carbon possesses a highly developed porous structure with an appropriate balance of micropores and mesopores, enabling it to effectively adsorb gaseous and liquid pollutants. Due to these properties, it is widely applied in the chemical industry, medical sector, and various other fields. At present, different types of plant biomass are used for the production of numerous valuable products [2–10]. Various natural raw materials are also employed for the preparation of activated carbon, including almond shells, hazelnut shells, walnut shells, plum pits, other fruit residues, sunflower husks, wood [3–11], sugarcane bagasse, rice husks, and similar agricultural by-products.

One of the methods for CO_2 utilization is its use in the production of materials such as plastics, concrete, and biofuels. At present, various technologies have been developed and implemented for this purpose, including chemical and physical absorption using solvents, membranes, and cryogenic separation [12–29].

However, absorption solutions, particularly those based on organic amines for CO_2 capture, cause significant environmental harm due to volatile and corrosive components. Physical adsorption methods are preferable, as they allow the control of gas streams with low CO_2 content and ensure a high degree of gas separation, which cannot be achieved by other techniques [3–15]. Moreover, physical adsorption is applicable over a wide range of temperatures and pressures, is simple to operate, environmentally friendly, cost-effective, and enables rapid regeneration [4–12].

It is important to note that the use of adsorbents derived from agricultural waste is a promising and necessary area, as it contributes to the reduction of greenhouse gas concentrations in the atmosphere while also recycling waste materials [5–14]. In recent years, one of the fruit crops cultivated in Azerbaijan is the almond tree, which yields a high harvest. During almond processing, substantial amounts of practically non-recyclable waste are generated in the form of nutshells, which are often incinerated. Available scientific and technical literature indicates the feasibility of converting such waste into high-quality adsorbents [12, 13]. Therefore, research in this area is highly relevant and justified, particularly for utilizing national waste resources as raw materials for the production of activated carbons (AC).

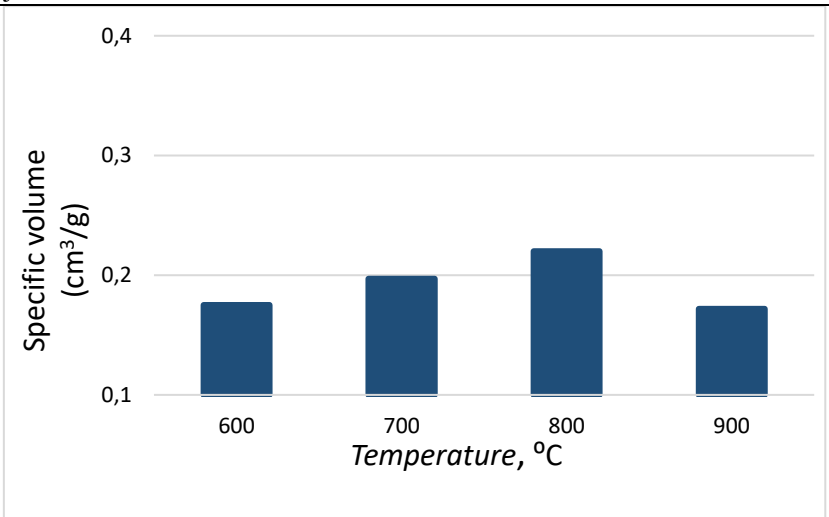
Experimental

In the present study, a series of carbon adsorbents (CMO) were prepared from almond shells. The synthesis of AC involved the following steps: washing, drying, and grinding the shells, sieving to particle sizes of 2–3 mm, and carbonization of the almond shell particles at 600–900 °C (with 100 °C increments) in an oxygen-free muffle furnace at a heating rate of 10 °C/min.

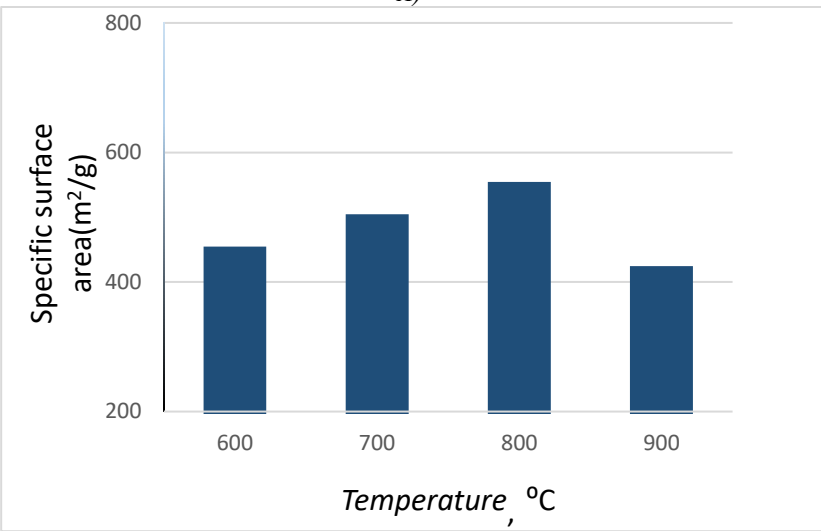
Activation of the resulting carbon was carried out using KOH, with the temperature and carbon-to-alkali ratio treated as variables for optimizing the activation conditions. Semi-coke samples were mixed with KOH in ratios of 1:1, 1:2, and 1:3 in a steel vessel. Thermochemical activation was performed at 800 °C with a heating rate of 10 °C/min for 60 minutes [10]. After cooling, the samples were washed with distilled water until the filtrate reached a pH of 8, followed by drying in an oven at 120 °C for 12 hours. The textural properties of the AC samples were determined from standard low-temperature (77 K) nitrogen adsorption/desorption isotherms.

Results and discussion

The first step in optimizing the synthesis conditions was selecting the carbonization temperature for each type of almond shell, based on the information obtained regarding the porous structure of the carbon sample.



A)



B)

Fig. 1. Dependence of (A) specific volume and (B) specific surface area on the carbonization temperature of almond shells

As shown in Fig. 1, increasing the carbonization temperature from 700 to 800 °C leads to an increase in both the porosity and the specific surface area of the samples, reaching 0.21 cm³/g and 545 m²/g, respectively. A further increase in the carbonization temperature results in a decline in the surface porosity parameters of the samples. Low-temperature nitrogen adsorption isotherms were measured for the alkali-activated semicoke samples obtained with different semicoke/KOH ratios (Fig. 2).

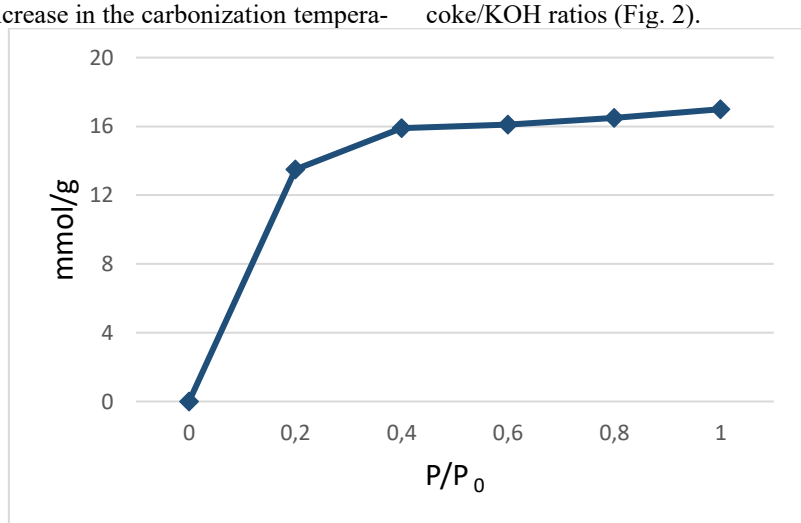


Fig. 2. *Nitrogen adsorption-desorption isotherms of the activated samples measured at 77 K*

A comparison of the calculated data for the activated samples obtained under different activation conditions revealed that an increase in the carbon/alkali ratio leads, according to BET analysis, to an increase in both the specific surface area of the samples and the micropore volume by approximately 1.8-2 times. The maximum mesopore volume was achieved at a carbon/KOH ratio of 1:3; under these conditions, the calculated effective width of slit-shaped micropores decreased slightly [8]; The obtained activated carbon samples were further evaluated for the adsorption of heavy metals from aqueous solutions of their salts (Table).

Table

Kinetic parameters of the removal of heavy metal ions from individual aqueous solutions using activated carbon.

Interfacial time, min	Adsorption, (mg/g)		
	Cu2+	Cr3+	Pb2+
0	100	100	100
5	45	60	55
15	50	65	60
25	52	60	60
35	52	62	60

The data presented in the table indicate very rapid kinetics of ion-exchange fixation of the investigated cations, with the process being completed within 3–5 minutes. The results also demonstrate the highest purification efficiency of activated carbon for solutions containing approximately 65% Cr^{3+} ions. A lower degree of removal was observed for Pb^{2+} (~55%) and Cu^{2+} (~45%) ions.

As a result of the conducted study, it was established that almond shell can be used as an effective adsorbent for the capture and storage of carbon dioxide. The optimal carbonization temperature (800 °C) and the optimal KOH/carbon ratio were determined for the preparation of activated carbons with a pore structure favorable for CO_2 adsorption. It was found that the presence of micropores with sizes in the range of 0.65–0.75 nm in the adsorbents results in a high adsorption energy of approximately 30 kJ/ mol and an initial heat of CO_2 adsorption of about 35 kJ /mol.

Industrial waste is insufficiently neutralized upon release into the environment, primarily due to the high market cost of activated carbon and the near absence of domestic production. Therefore, locally generated wastes in Azerbaijan particularly almond and walnut shells, as well as plum and apricot pits and similar material can be considered promising raw material sources for the production of activated carbon.

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ECONOMICS

THE IMPACT OF DEPRECIATION EXPENSES ON FINANCIAL RESULTS FOR LEASE-ACQUIRED ASSETS IN AVIATION ENTERPRISES

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DOI: 10.5281/zenodo.19364406

Abstract

In modern times, the role of leasing in the process of acquiring aircraft by airlines is increasing. As a result of the application of International Financial Reporting Standard No. 16 (IFRS 16) entitled "Leases", assets acquired under leasing agreements are recorded as "right-of-use assets" in the balance sheet of enterprises and depreciation expenses are calculated on the value of these assets. These expenses have a significant impact on the financial results (operating profit or loss) and asset structure of airlines. The study analyzed the reflection of depreciation expenses on assets acquired through leasing in financial statements, their share in operating expenses and their impact on financial results based on the consolidated financial statements of "Azerbaijan Airlines" CJSC and the independent auditor's report. [1]

Keywords: leasing, depreciation expenses, right-of-use assets, financial results, AZAL.

Introduction. The main production assets of aviation enterprises are aircraft, which are highly capital-intensive. Due to the requirement of large initial investments when purchasing these assets, leasing mechanisms have begun to be widely used. Through leasing, the right to use high-value assets is obtained, while the financial burden is carried out in the form of lease payments over a contractually agreed period. This process enables optimal management of cash flows and contributes to the liquidity and stable strategic operations of aviation enterprises. [2]

Since 2019, with the implementation of the IFRS 16 standard, significant changes have occurred in lease accounting. Accordingly, operating leases have begun to be recognized on the balance sheet as "right-of-use assets" and "lease liabilities". As a result, depreciation expenses are calculated for aircraft operated through leasing, and these expenses influence the financial results of aviation enterprises. [3]

The main objective of the study is to analyze the impact of depreciation expenses related to assets acquired under lease agreements on financial results and to determine future strategies for the application of leasing by airlines.

Methods. In this study, a comprehensive methodological approach was applied in order to evaluate the impact of the leasing mechanism on financial results. Methods of analysis and synthesis, as well as comparative and structural analysis of financial statements and normative analysis of the IFRS 16 standard, were used. The empirical analysis was conducted based on financial indicators taken from the consolidated financial statements and the independent auditor's report of Azerbaijan Airlines, and the dynamics of these indicators were examined for the period 2021–2024.

Accounting and Depreciation of Lease-Acquired Assets. The application of the provisions of IFRS 16 in lease accounting has led to significant structural changes in the financial statements of airlines. In accordance with the requirements of this standard, from the moment a lease agreement enters into force, airlines recognize assets obtained through leasing and the related lease payments in their balance sheets both as "right-of-use assets" and as "lease liabilities". [4]

A right-of-use asset is depreciated over the lease term or the useful life of the asset, while interest expense is calculated on the recognized lease liability using the effective interest method. As can be seen, lease payments affect financial results in the form of depreciation and interest expenses.

The application of leasing increases the volume of assets and liabilities on the balance sheets of airlines, while also increasing depreciation expenses and significantly influencing the level of operating profit. The growing role of leasing operations in airlines increases the importance of their accurate reflection in financial statements.

Empirical Analysis (Case of AZAL)

Table 1 reflects the dynamics of right-of-use assets, lease liabilities, depreciation expenses, and total assets of Azerbaijan Airlines for the period 2021–2024.

Table 1.

Selected indicators from the financial statements of AZAL CJSC for 2021–2024 (in million manats).

Indicators	2021	2022	2023	2024
1. Value of right-of-use assets	345.6	519.2	303.2	354.3
2. Lease liabilities (long-term)	232.9	330.3	123.0	78.0
3. Lease liabilities (short-term)	50.0	66.3	55.6	118.0
4. Depreciation expenses	127.4	126.7	157.1	206.1
5. Total assets	1,968.3	2,241.2	2,614.9	2,930.7

Source: https://www.azal.az/az/corporate-information/financial-reports/

According to the indicators for 2021–2024, right-of-use assets account for more than one quarter of total assets. These indicators clearly reflect the strategic role of the leasing mechanism in the airline and demonstrate that it serves as a key financing instrument for acquiring highly capital-intensive assets.

While total lease liabilities amounted to 282.9 million manats in 2021, this indicator decreased to 196.0 million manats by 2024. The data presented in Table 1 indicate that the main reason for this decline was the more rapid decrease in long-term lease liabilities (threefold) compared to the increase in short-term lease liabilities (2.36 times), which suggests an expansion in the use of operating leasing.

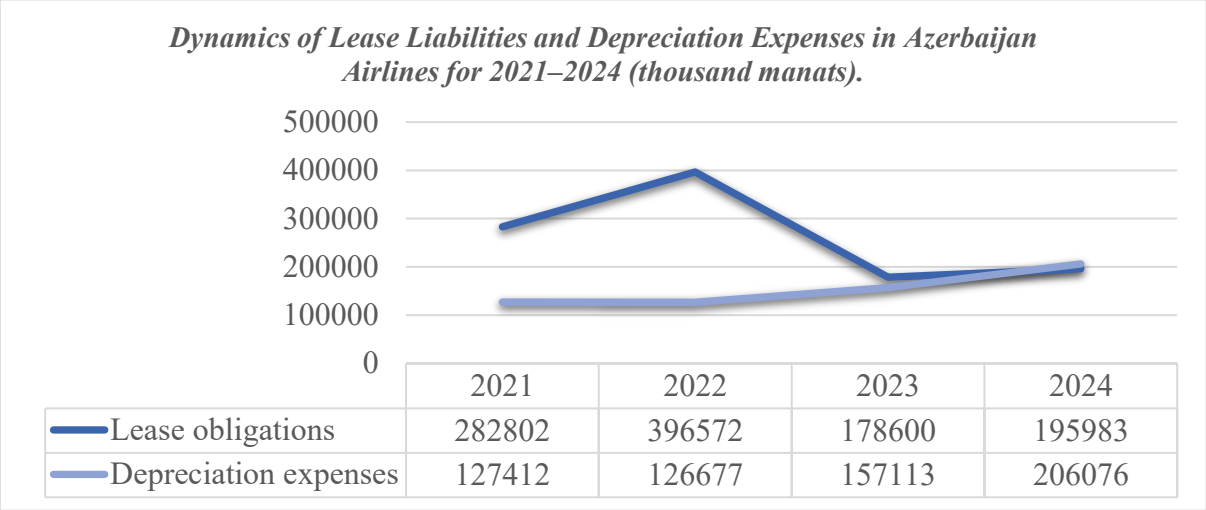

Diagram 1.

Source: https://www.azal.az/az/corporate-information/financial-reports/

As shown in Diagram 1, there is a close relationship between lease liabilities and depreciation expenses. In other words, an increase in lease liabilities directly affects the level and growth rate of depreciation expenses. Empirical results confirm that the increase in the carrying value of right-of-use assets plays a significant role in the rise of depreciation expenses. Although the growth rate of depreciation expenses is observed over the years in Diagram 1, fluctuations in lease liabilities, including both increases and decreases, can also be seen. This can be explained by the fact that in recent years Azerbaijan Airlines has relied more on operating leases rather than finance leases when acquiring aircraft. Under an operating lease agreement, the asset remains on the balance sheet of the lessor, while the lessee only pays the lease fee and does not recognize the asset on its own balance sheet.

The data presented in Table 1 also draw attention to the sharp upward trend in depreciation expenses. During the period 2021–2024, these expenses increased by 78.7 million manats, or 61.8%. The main reason for this increase is the recognition of aircraft obtained under lease agreements as “right-of-use assets” in accordance with the requirements of IFRS 16, and the subsequent recording of depreciation expenses related to these assets in the financial statements. This growth trend once again confirms the long-term impact of leasing operations on the cost structure of airlines.

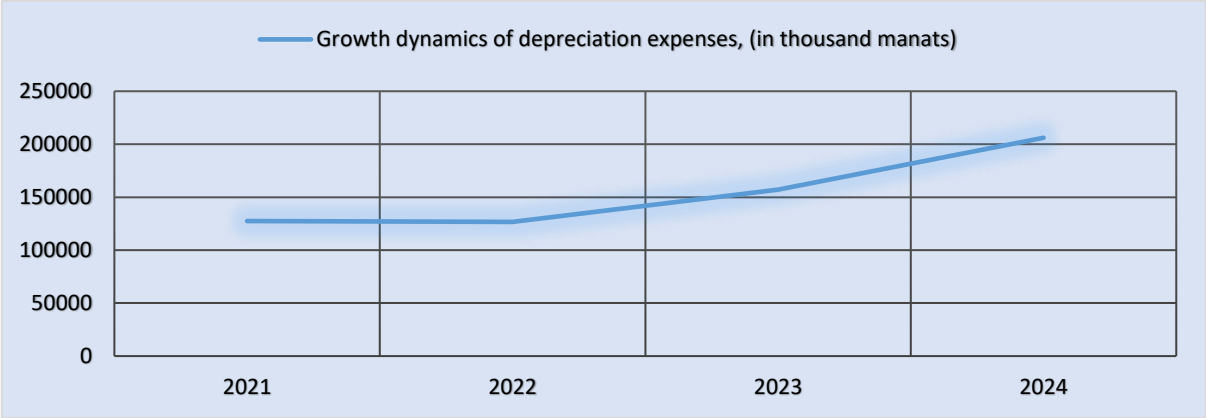

Diagram 2. Growth Rate of Depreciation Expenses for 2021–2024 in Azerbaijan Airlines.

Source: https://www.azal.az/az/corporate-information/financial-reports/

Diagram 2 illustrates the dynamics of depreciation expenses, highlighting an increase of up to 1.6 times over the period. The growth in depreciation expenses is associated with the recognition of aircraft acquired through leasing as "right-of-use assets" on the balance sheet. The expansion of the leasing portfolio and the significant share of long-term leases have increased the carrying value of right-of-use assets, which in turn has led to a rise in asset depreciation expenses over the years. At the same time, the continuation of depreciation expenses related to assets recognized in previous years in subsequent periods has become one of the key factors reinforcing the growth rate of depreciation expenses.

Conclusions and Offers

The results of the conducted research indicate that depreciation expenses related to assets acquired under lease agreements have a significant impact on the financial results of aviation enterprises. With the implementation of IFRS 16, the recognition of lease assets on the balance sheet increases the value of both assets and liabilities of airlines, while the calculation of depreciation for these assets leads to a reduction in operating profit.

On the other hand, leasing enables airlines to operate aircraft without making large initial capital investments in highly capital-intensive assets. This mechanism strengthens the liquidity position of companies and allows for more flexible management of the aircraft fleet. Therefore, it is advisable to analyze the impact of leasing on financial results not only from the perspective of increasing expenses but also in terms of revenue growth, strategic development, and sustainable operations of airlines such as Azerbaijan Airlines.

Based on the results of the study, the following recommendations are presented:

• Since the volume and composition of leasing transactions directly affect the financial stability and liquidity of the airline, the optimal balance of the portfolio should be constantly monitored;

• It is important to accurately determine the useful life of the right-of-use assets in accordance with real operational and technical indicators, as this ensures the correct calculation of depreciation costs and financial results;

• The impact of depreciation policy on financial results should be continuously monitored;

• A comparative analysis of the choice of leasing or outright purchase is advisable.

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TAX DESIGN MATTERS: THE IMPACT OF CIGARETTE EXCISE TAX STRUCTURE IN SHAPING GOVERNMENT REVENUES IN THE EU

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Abstract

The ongoing reform of the EU Tobacco Tax Directive creates an important opportunity to reassess how tobacco taxation can serve government fiscal objectives, particularly in raising stable and predictable revenues. This paper examines how different excise tax designs influence government revenue collection across EU member states, with a focus on the revenue effects of relying on specific versus ad valorem components.

The analysis employs a fixed-effects panel regression covering 27 EU countries from 2010 to 2024. In the analysis two hypotheses are tested: first, whether systems with a high reliance on specific excise taxation generate higher per capita tobacco tax revenues; and second, whether the revenue impact of such systems depends on regular adjustments to the specific tax component, such as indexation.

The results show that countries with a high share of specific excise taxes consistently collect more tobacco tax revenue per capita than those relying more on ad valorem taxation. The regression results suggest that the EU could potentially collect an additional €4 billion in revenue. However, this estimate should be interpreted with caution, as other unobserved factors may influence revenue outcomes. This increase is associated with a higher reliance on the specific component within the overall tax structure, even without raising tax rates, although other factors may also contribute. However, the analysis also reveals that, in the absence of indexation, increases in the specific share are associated with declines in revenue, likely reflecting erosion in real tax levels over time. By contrast, when specific taxes are regularly indexed, each additional percentage point in the specific share is associated with a positive and statistically significant change in revenue.

Based on this evidence, two key policy recommendations emerge:

1. EU member states may wish to consider prioritising specific excise taxes over ad valorem components to enhance fiscal returns, while considering national circumstances and administrative capacity.
2. Specific tax systems should incorporate adjustment mechanisms to safeguard revenues against inflation and market shifts.

Keywords: Excise tax, government revenues, tobacco, specific tax component, tax policy, tax collections, indexation, stable fiscal outcomes.

1. Introduction

The structure of a country's tax system is widely recognized as a key determinant of government revenue performance and long-term sustainability (Hines and Summers, 2009; Bucovetsky and Wilson, 1991). Globally, governments are confronted with the challenge of designing tax frameworks that not only ensure adequate revenue generation but also foster economic efficiency, equity, and, where applicable, support public health objectives. The composition of tax instruments, such as the relative shares of corporate tax, VAT, and excise tax, has significant implications for government revenue. Within a tax instrument, the structure (i.e., the balance between specific and ad valorem components) also affects both the level and volatility of revenues.

The design of an excise tax system for tobacco products should aim to balance fiscal and health objectives: ensuring adequate revenues while reducing tobacco consumption and related health risks. In the EU, excise taxation serves as a key instrument of both fiscal and public health policy.

Over the past decades, the EU has engaged in an active debate on the merits of shifting towards a fully specific excise system. Both theoretical and empirical evidence suggest that specific taxation delivers more predictable fiscal revenues, reduces opportunities for tax avoidance by manufacturers, and strengthens market transparency. At the same time, its effectiveness depends heavily on robust administration and enforcement. Without strict tax discipline, the shift toward specific taxation may increase incentives for illicit trade and undermine the revenue base. This raises an important policy question: can the adoption of a fully specific excise, combined with effective enforcement, deliver sustainable positive outcomes for EU Member States, both in terms of fiscal revenues and public health gains?

Theoretical and empirical work converge on this point. Keen (1998) and subsequent studies show that only under strict enforcement and effective administration can specific excises deliver their intended potential, reducing opportunities for tax evasion and securing both higher fiscal revenues and lower consumption. Recent empirical evidence reinforces this conclusion. Primorac et al. (2024) find that while both tax types contribute to revenue, specific excise taxes yield more stable and predictable fiscal streams, largely by limiting consumer down-trading to cheaper brands. By contrast, ad valorem taxes remain more vulnerable to market price shifts and consumer substitution. These findings are directly relevant for policymakers seeking to balance fiscal stability with broader societal goals, including the reduction of harmful consumption.

Despite a longstanding debate in the public finance literature regarding optimal tax structure, empirical evidence on the direct relation between tax structure and government revenue remains limited. Accordingly, this study seeks to contribute to the literature by

examining the effects of different excise tax types, most notably specific and ad valorem excise taxes, on government revenues across the EU.

This paper presents a panel data analysis comparing the revenue performance of specific versus ad valorem tobacco excise tax structures across 27 EU countries over a 15-year period.

While previous literature has proposed theoretical arguments and presented case-specific observations, this study provides systematic, cross-national evidence to analyse the revenue performance of specific taxation, especially when combined with indexation. The study employs a fixed-effects regression framework to control for unobserved heterogeneity across countries and years. While this approach improves internal validity, it may not fully eliminate the possibility that observed revenue effects are influenced by other country-specific or temporal factors. By employing a fixed-effects panel regression and controlling for key confounding factors, we demonstrate that a higher reliance on specific excise taxes, particularly when regularly indexed to inflation, is associated with stronger and more stable per capita tobacco tax revenues. Our findings quantify the potential fiscal gains from excise tax reform and offer nuanced policy guidance, filling a gap in the literature by moving beyond theoretical arguments and case studies to robust, large-scale evidence.

It is important to note that the economic effects discussed throughout this analysis are specific to the European customs union. The customs union framework significantly influences both the regulatory environment and market responses in EU member states, setting them apart from countries outside such unions. In contrast, countries that have implemented significant tobacco tax reforms, such as Australia, New Zealand, and Canada, are not members of a comparable customs union. As a result, their tax structures are not subject to harmonized excise directives or common external tariffs, giving them greater flexibility to design fiscal policies tailored to their specific needs.

2. Literature Review

Academic literature has extensively examined the impact of excise tax structures on consumer behaviour, particularly in the context of cigarette taxation. The growing body of literature highlights the role of tax design in shaping consumption patterns, supporting public health objectives, and enhancing revenue generation amid global fiscal tightening. Empirical evidence underscores the effectiveness of well-designed excise taxes in promoting price increases, revenue stability, and health outcomes.

The question of shifting from a mixed excise structure to a uniform specific excise is a particular case of the broader problem of optimal taxation, originally formulated by Ramsey in the early twentieth century. His framework sought to minimize deadweight losses from taxation while preserving revenues and has since been applied to evaluate the relative merits of specific and ad valorem excises. The analysis becomes more complex under conditions of imperfect competition. In such settings, the tobacco sector can be modelled in different ways: as an oligopoly when the emphasis is on government regulation, as monopolistic competition when consumer preferences are central, or as a differentiated-product oligopoly when the focus is on competitive dynamics.

The EU tobacco sector is highly concentrated. Therefore, early theoretical contributions treated the EU tobacco sector as an oligopolistic industry. Delipalla and Keen (1992) argued that under imperfect competition ad valorem taxation could lower prices and profits while enhancing overall welfare. Similarly, Myles (1996) found that a mix of both instruments could maximize revenues, with the ad valorem component reducing firms' market power and bringing outcomes closer to perfect competition. Taken together, these early models suggested that raising the ad valorem share while minimizing the specific component might align with fiscal and health objectives. However, such analyses did not account for the role of illicit trade, a critical omission in later debates.

Subsequent research incorporated the role of the illegal tobacco market and found that ad valorem increases provide stronger incentives for illicit trade than specific increases. Delipalla (2009), in examining tax harmonization in the EU, demonstrated three core results clarifying how tax systems need to be adjusted to reduce the market share of illicit products. Crucially, shifting the balance toward specific taxation reduces incentives for illegal trade while safeguarding fiscal revenues.

Other studies have shown that under conditions of cost uncertainty (for instance, input price volatility), ad valorem excises amplify fluctuations in output and prices, whereas specific taxes deliver greater predictability in revenue collection (Kotsogiannis and Serfes 2013). Goerke (2008, 2011) and Delipalla and O'Donnell (1998) further demonstrated that, under imperfect competition, specific excises are more effective in limiting the affordability of cheap cigarettes, thereby raising retail prices, and reducing consumption, an outcome of central importance for public health.

These findings are aligned with the WHO FCTC and the broader economic literature, including Laffer (2014). Article 6 and the related guidelines of the FCTC emphasize that excise structures should minimize incentives for consumers to shift to cheaper brands or categories in response to tax-induced price changes. A uniform specific tax does not fully eliminate opportunities for down-trading but ensures that any switch to cheaper products does not erode tax revenues, since the same amount of tax is levied per unit regardless of price. Laffer similarly underscores that the main advantages of a uniform specific tax are its ability to reduce substitution toward cheaper products, preserve the tax base, and secure revenue independent of firms' pricing strategies. Taken together, the evidence highlights that finding the optimal balance between ad valorem and specific excises remains a complex policy challenge, given the dual objectives of improving public health and containing illicit trade.

More recent studies, such as Primorac and Jeric (2017), confirm that higher specific taxation leads to a statistically significant reduction in cigarette consumption, whereas ad valorem increases do not. Moreover, specific tax increases raise excise revenues, while ad valorem rates have no significant effect. In practice, ad

valorem components are increasingly used to protect domestic producers rather than to achieve fiscal or health objectives. A study conducted by Primorac et al. (2024) analyses the effects of excise tax structures on cigarette pricing across EU member states, with particular emphasis on the pass-through rate of ad-valorem and specific taxes to consumers. Similarly, Chaloupka et al. (2010) provides an extensive analysis across 21 EU member states between 1998 and 2007, showing that reliance on ad-valorem taxes widens price gaps and increases volatility of revenues.

International financial institutions such as the IMF and the World Bank have increasingly engaged in tobacco taxation reform as part of broader efforts to strengthen public health systems and enhance domestic revenue mobilization. Tobacco taxes are viewed with a dual objective: reducing the health burden and external costs associated with smoking, while generating sustainable revenue. Within this context, international financial institutions' recommendations emphasize three core principles: (i) the greater effectiveness of specific excise taxes compared to ad valorem taxes, (ii) the simplification of tax regimes through a reduction in tiers, and (iii) the adoption of gradual, incremental increases through long-term planning or inflation-adjusted indexation. These principles are supported by empirical and policy evidence. Specific taxes are preferred over ad valorem taxes due to their greater effectiveness in reducing consumption and generating stable, predictable revenues. They also reduce incentives for consumers to substitute higher-priced brands for lower-priced ones, a behaviour especially relevant for poorer and younger smokers given budget constraints (WHO, 2010). Simplification of tax structures improves administrative efficiency and limits opportunities for avoidance, while inflation-adjusted increases preserve the real value of specific taxes. Collectively, these guidelines reinforce the rationale for specific-heavy systems as both fiscally robust and aligned with public health objectives.

3. Institutional Context and European Experience

3.1. Excise tax structure

The design of tobacco excise taxation varies substantially across countries, reflecting differing policy objectives and institutional legacies. Broadly, three approaches to tobacco taxation can be identified in the global landscape. Some countries employ a purely specific excise system, where taxes are levied as a fixed amount per unit (e.g., Indonesia). Others utilize a purely ad valorem system, taxing tobacco as a proportion of its value (e.g., Saudi Arabia). A third group adopts a mixed system, combining both specific and ad valorem components; this approach is employed in EU countries.

The relative importance of each component in mixed systems is not uniform. For instance, Denmark applies a high specific excise rate and a nominal 1% ad valorem rate on cigarettes, resulting in the specific component accounting for most of the tax revenue. Figure 1 presents a global overview, classifying countries by predominant source of cigarette excise tax revenue. For countries with a mixed system, classification is based on the share of each tax type in the weighted average price (WAP) of cigarettes; the larger share determines the country's allocation. In the figure, grey denotes a greater reliance on specific excises, while dashed colour indicates predominance of ad valorem taxes. In this sample, most countries derive the majority of cigarette tax revenue from specific excises, whereas European countries exhibit considerable heterogeneity.

Figure 1
Map indicating the predominant source of cigarette tax revenue: specific excise (grey) vs. ad valorem (dashed)
Notes: This figure illustrates countries with greater reliance on specific taxes (grey) vs. ad valorem taxes for excise taxes of cigarettes.

The evolution of the specific excise share in total tobacco excise taxation within the EU has been similarly diverse. Figure 2 depicts shares of specific or ad valorem tax components within EU member states on overall excises on cigarettes, ranging from a specific share as low as 14.0% in Luxembourg, to an almost fully specific tax system of 98.5% in Denmark.

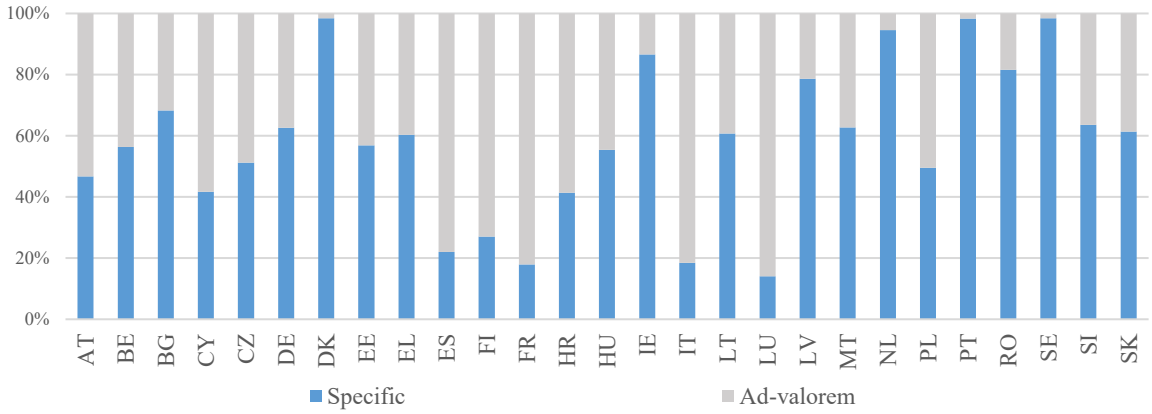

Figure 2: Structure of the excise taxes on cigarettes in EU countries in 2025

Notes: Source: European Commission (2025)

Tobacco excises in the EU countries are regulated by the provisions of the Directive on excise duties for manufactured tobacco (Council Directive 2011/64/EU), which mandates that cigarettes be subject to a mixed excise tax structure including a specific component of expressed as a fixed amount per 1,000 cigarettes, and an ad valorem component - expressed as a percentage of the maximum retail selling price.

3.2. Illicit trade

Illicit cigarette trade in the EU is highly responsive to changes in excise tax rates and enforcement. Rapid tax increases often coincide with surges in illicit activity, especially in border regions and where price gaps are large. The shadow market is supply-driven, with intermediaries sourcing products through legal, counterfeit, and smuggling channels. Like legal trade, illicit transactions are shaped by affordability and demand elasticity, but benefit from evading taxes and regulatory measures, operating under more favourable financial conditions. World Bank (2017) estimates suggest illicit trade lowers average retail prices by about 4% and raises overall consumption by 2%, though these figures do not reveal the true market size due to displacement and risk premium uncertainties.

International evidence (WHO, WCO, IMF, World Bank, ITIC) shows that legitimate products are often used to mask illicit flows, making exclusive reliance on unregulated sources rare. The effectiveness of enforcement and control mechanisms is therefore crucial. According to the IMF (2016), illegal trade occurs via smuggling, counterfeit stamps, and illicit production, causing revenue losses and undermining tax policy and public health. Addressing this requires comprehensive strategies: stronger border controls, modern detection technologies, capacity-building, and international cooperation.

A key element is robust tracking and tracing systems, with unique identifiers enabling authorities to monitor products from manufacture to sale. The EU has advanced such systems, aligning with international standards, and ensuring independence from the tobacco industry (World Bank, 2019).

Despite a long-term decline in aggregate cigarette consumption (from 660 billion units in 2007 to 424 billion in 2024), illicit and non-domestic legal consumption remain significant, 9.2% and 6.2% of total consumption, respectively, in 2024 (see Figures 3 and 4). Illicit consumption fell from 9.8% to 7.2% between 2010 and 2019, then rose again post-pandemic. Increases in ad valorem taxes tend to widen price gaps and incentivise illicit trade, while specific taxes compress price differentials and reduce illicit profit margins. Regular indexation of specific rates, combined with strong enforcement, is essential for improving public health and revenue outcomes across the EU.

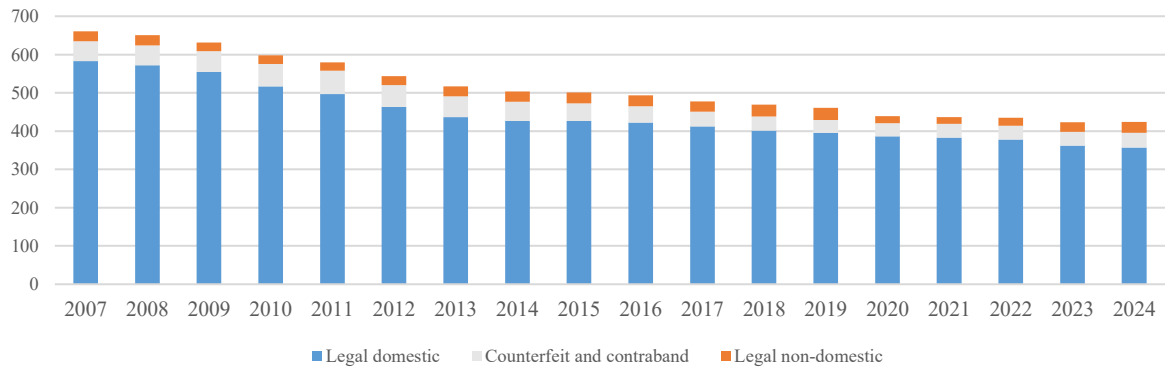

Figure 3: Total manufactured cigarette consumption in EU27 Countries from 2015 to 2025 (bn. cigarettes). Source: KPMG (2013-2025). Illicit Cigarette Consumption in Europe.

Note: Legal non-domestic refers to a product that is brought into the market legally by consumers, such as during cross-border trip.

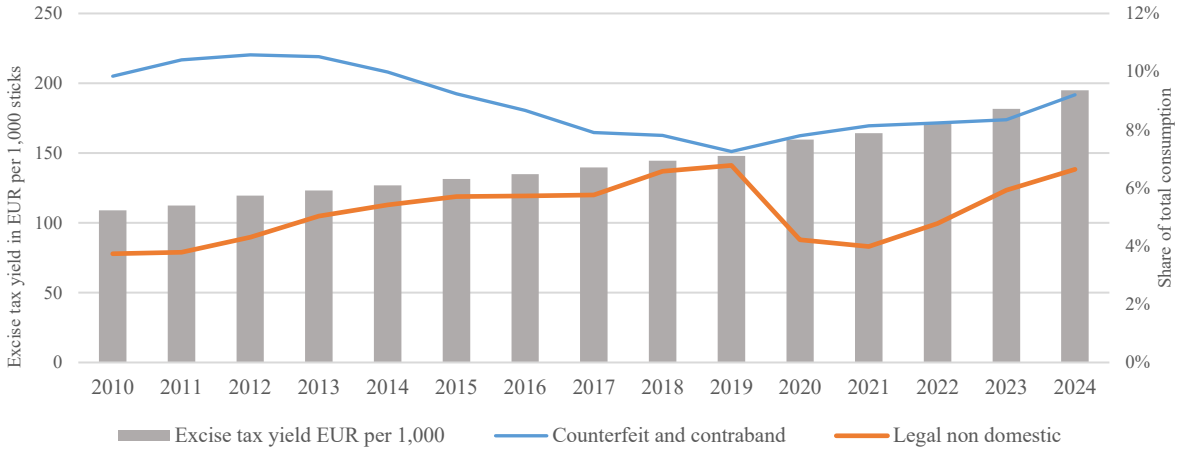

Figure 4: Average excise tax yield per 1,000 cigarettes and illicit cigarette consumption in EU27 Countries from 2015 to 2025.

Source: KPMG (2013-2025). Illicit Cigarette Consumption in Europe, European Commission (2015, 2025).

3.3. Country-Level Illustrations: Austria and the Czech Republic

This subsection examines two country cases. Austria represents a case of increasing reliance on specific taxes alongside rising revenues, while the Czech Republic illustrates the opposite trajectory.

Austria has traditionally implemented a higher proportion of ad valorem than specific excise taxes. However, in recent years the government introduced gradual changes to the cigarette excise structure, which have seen the importance of specific excise taxes grow considerably. While, in 2023, the specific excise proportion of total taxation in Austria of 36.1% remained below the EU average of 44.5%, the changes in the burden of specific and ad valorem excise taxes are due to rebalancing undertaken by the Austrian authorities.

The specific excise tax rate rose from EUR 26.69 per 1,000 cigarettes in 2010 to EUR 83.5 in 2025. During the same period, the ad valorem rate as a percentage of the retail selling price (RSP) declined from 43.0% to 32%. As a result, the share of the specific component in total taxation increased from 18.28% in 2010 to 36.3% in 2025. Over the same period, tax receipts from cigarettes in Austria increased from EUR 1.5 billion in 2010 to EUR 2.1 billion in 2024 (see Figure 5). This increase reflects the joint effect of rising specific rates and retail prices, consistent with the revenue-enhancing pattern observed in high-specificity regimes.

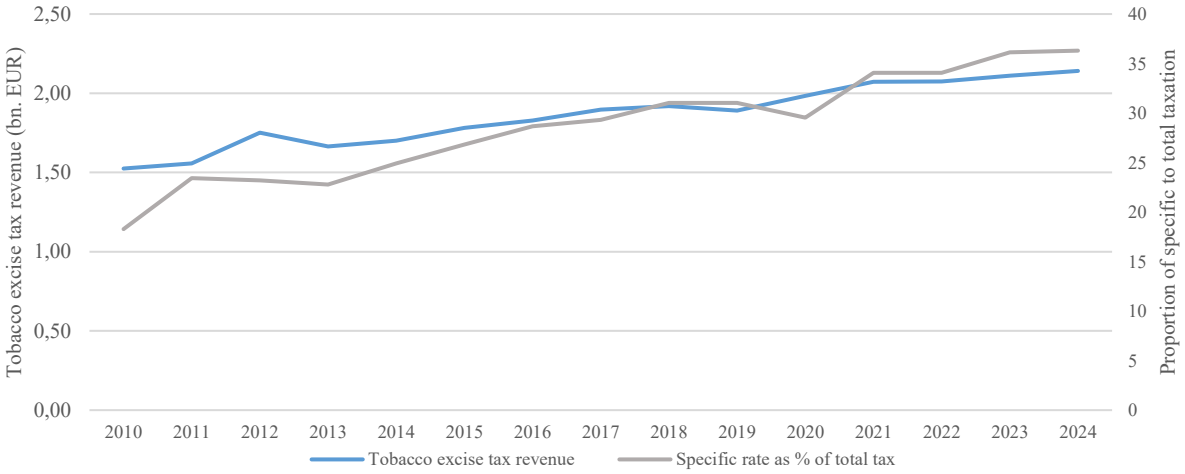

Figure 5: Tobacco excise tax revenues and proportion of specific excise as a percentage of total taxation in Austria 2010 to 2024.

Source: European Commission (2025) Excise duty tables on tobacco.

In contrast, the Czech Republic has historically placed a higher weight on the specific component of cigarette taxation. The specific excise tax rate rose from EUR 42.09 per 1,000 cigarettes in 2010 to EUR 90.2 in 2025. During the same period, the ad valorem rate as a percentage of RSP rose from 28.0% to 30.0%. However, the specific share declined from 42.5% in 2021 to 39.9% in 2023. During this same period, total tobacco excise revenue fell from CZK 59 billion to CZK 52 billion (see Figure 6). This reversal aligns with the regression findings presented earlier: a weakening of the specific component, absent compensating adjustments, is associated with declining revenue performance.

Taken together, the experiences of Austria and the Czech Republic illustrate the broader pattern emerging from the panel analysis. Strengthening the specific

share, especially when combined with regular adjustment mechanisms can contribute to higher and more stable government revenue from tobacco taxation. Conversely, erosion of the specific share may undermine revenue outcomes even in systems that initially relied heavily on specific taxes.

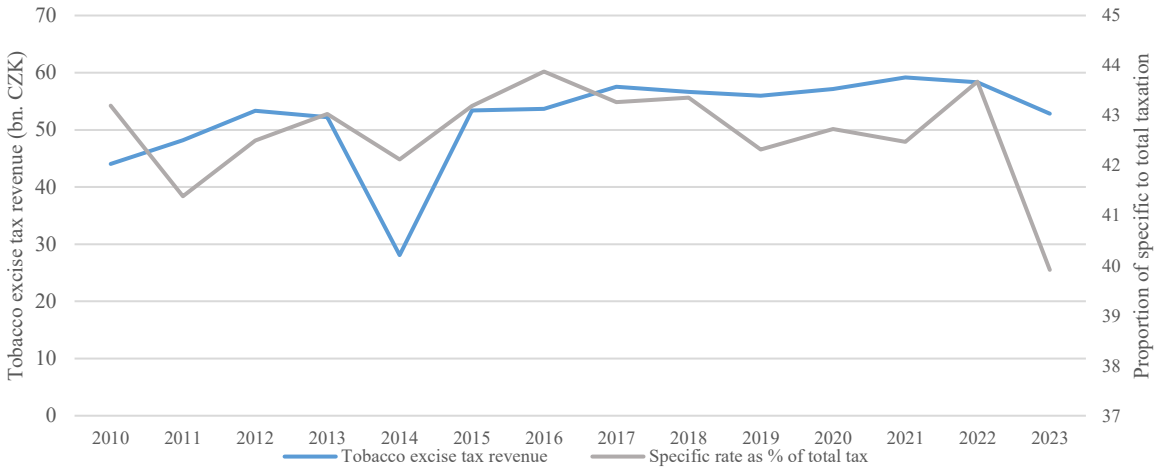

Figure 6: Tobacco excise tax revenues and proportion of specific excise as a percentage of total taxation in the Czech Republic 2010 to 2023.

Source: European Commission (2025) Excise duty tables on tobacco.

4. Methodology

To complete the initial observations about the positive correlation between tobacco excise tax revenue and the proportion of specific excise taxes to total taxation in Austria and the Czech Republic, we turn towards regression analysis.

This section describes the identification strategy to estimate the impact of cigarette excise tax structure on government revenues. By analysing the evolution of excise tax revenues in EU countries over time, it aims to identify whether excise tax structure has a significant impact on governments' ability to raise revenues, considering market size, prices, and tax levels, and controlling for other differences between countries that may affect revenue levels and evolution over time.

Using EU countries allows to build a panel of complete and comparable market data for 27 countries over 10 years, including tax revenues, sales volumes, prices, and excise tax structure.

4.1. Variables

The variable of interest is the revenue from cigarette excise taxes. To make cigarette excise tax revenues comparable across countries of different size, we calculate cigarette tax revenues per capita by dividing total annual cigarette tax revenues with the population size of the respective year. The resulting annual tax revenues per capita are used as the dependent variable.

Regarding independent variables we are mostly interested in ad valorem and specific tax rates. However, as we are not interested in the effect of the level of taxes, but the composition of taxes on tax revenues, we transform the specific tax rates to a specific ratio. The specific ratio is the share of the specific component on the total excise tax at the weighted average price (WAP):

$$specific\ ratio = \frac{specific\ tax\ rate}{total\ excise\ tax\ at\ WAP} = \frac{specific\ tax\ rate}{specific\ tax\ rate + ad\ valorem\ tax\ rate * WAP}$$

To capture the other factors that may affect the tax revenues as well as the tax structure, we additionally add the share of the illicit market and inflation to the regression as control variables.

4.2. Specification

We estimate two specifications in a two-way fixed-effects framework (country- and year-fixed effects), controlling for inflation and the illicit market share. The dependent variable, Rev_{it}, is government cigarette excise tax revenue per capita in country i in year t. Our policy variable is the specific ratio S_{it}. Specification 1 tests for a threshold (high-specific) regime using a dummy variable $D_{it}^{high} = 1[SR_{it} \geq 0.70]$. Specification 2 uses a continuous ratio and interacts it with a country-level indicator R_{it} that equals 1 when the specific component regularly increases (e.g., due to indexation or stable legislative updating). We rely on a two-way fixed effects panel OLS model, which appropriately controls for unobserved country- and time-specific heterogeneity. While dynamic estimators such as System GMM could, in principle, address potential endogeneity, our dataset does not provide the necessary conditions for their valid application, given the limited time dimension and the high risk of instrument proliferation.

$$Rev_{it} = \beta_1 D_{it}^{high} + \boldsymbol{\delta^T X_{it}} + \mu_i + \tau_t + \epsilon_{it} \quad (1)$$

$$Rev_{it} = \beta_2 SR_{it} + \beta_3 (SR_{it} \times R_i) + \boldsymbol{\delta^T X_{it}} + \mu_i + \tau_t + \epsilon_{it} \quad (2)$$

Variable definitions:

- Rev_{it}: government cigarette excise tax revenue in country i in year t
- SR_{it}: specific ratio, i.e., (specific excise tax rate)/(total excise tax rate at WAP)
- D_{it}^{high}: indicator equal 1 if $SR_{it} \geq 0.70$, 0 otherwise
- R_i: country-level dummy equal to 1 where policy frameworks produce regular increases in the specific tax (e.g., indexation), 0 otherwise
- $X_{it} = (Inflation_{it}, IllicitShare_{it})$: vector of controls
- μ_i: country fixed effects, τ_t: year fixed effects, ε_{it}: error term

The first specification captures potential non-linear, threshold effects when the specific component dominates the tax structure (≥70%). The second traces the marginal effect of the specific ratio across its full range and tests whether that effect is systematically different in institutional environments with predictable, rule-based adjustments. With country and year fixed effects, identification comes from within-country variation over time, while time-invariant cross-country differences (including baseline market size) and common shocks are absorbed by μ_i and τ_t, respectively.

5. Empirical Results

This section presents the empirical results on the relation between cigarette excise tax structure and government revenue. The analysis draws on a panel dataset of EU member states, covering the period from 2010 to 2024, with Luxembourg excluded due to its distortionary effect from cross-border purchases. The findings are structured in three parts: first, the average revenue effects associated with a high specific ratio are reported; second, the interaction between countries relying heavily on specific taxes and indexation practices is explored.

5.1. Revenue Effects in High-Specificity Countries

Table 1 reports the basic regression results covering the years 2010 to 2024, with the dependent variable being cigarette excise tax revenues per capita. The results indicate that countries with a high share of specific excise taxes are associated with higher per capita tobacco tax revenues compared to those relying more on ad valorem taxation.

Table 1

OLS Regression Estimates – Revenue Effects in High-Specificity Countries

	Cigarette Excise Tax Revenue per Capita
High Specific Ratio	10.637* (0.0631)
Inflation	2.2729*** (0.0046)
Share of NDP	-1.5770*** (0.0000)
Country-Fixed Effects	Yes
Year-Fixed Effects	Yes

*This table reports the average slopes and p-values from yearly OLS regressions (Equation 1). Standard errors are heteroskedasticity robust. The table reports the estimates of a High Specific Ratio that is an indicator variable equal to one if the specific ratio is equal or exceeds 70% of the ETY. *, **, *** denote significance at the 10%, 5%, and 1% level.*

Countries with a share of specific excise taxes equal or exceeding 70%, have on average €11 more per capita than countries with a lower specific share. The coefficient estimate on the high-specificity indicator is positive and statistically significant (p-value = 0.0631). To ensure that the observed revenue effects are not confounded by macroeconomic factors or alternative regulatory tools, the model includes two key control variables: inflation and the share of non-duty paid products (NDP). Inflation shows a positive relation with revenue, as higher consumer prices naturally increase the nominal tax base. By contrast, the negative coefficient on NDP share suggests that a higher share of illicit market activity is associated with lower government revenues. This supports the interpretation that structural tax design, particularly the role of specific taxation plays a distinct and more effective role in explaining differences in per capita revenue outcomes.

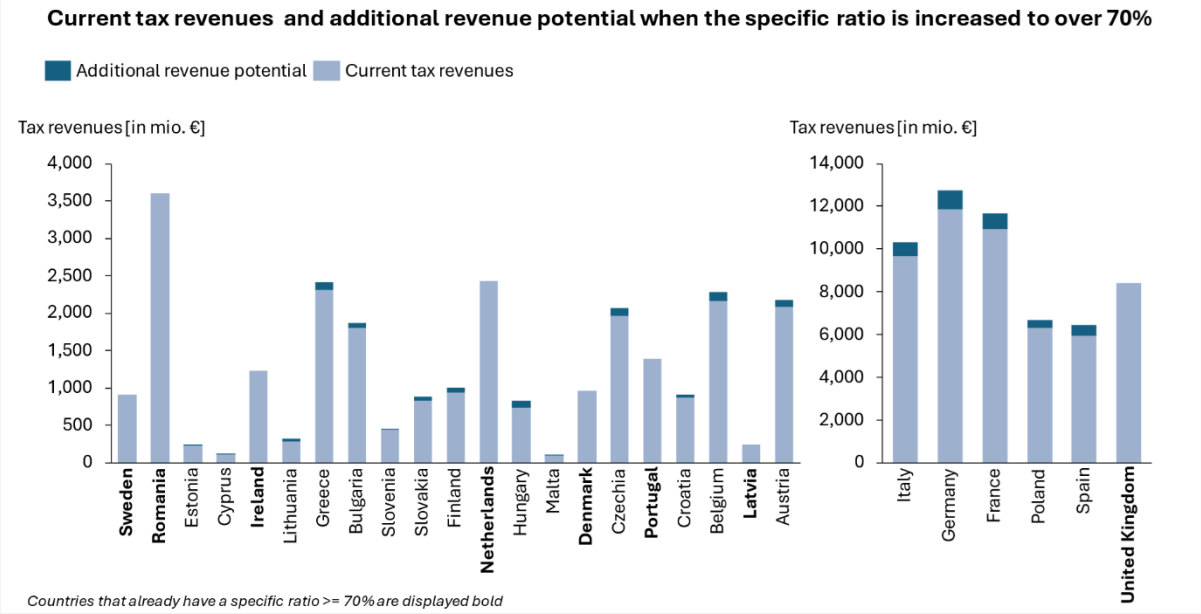

Figure 7: Current Tax Revenues and Additional Revenue Potential Per Country if the Share of the Specific Tax in Total Taxation Is Increased to over 70%

Note: Additional revenue potential based on cigarette excise tax revenue. The light blue bar represents current cigarette tax revenues (in million €, for the latest year available) and the dark blue segment shows the additional potential revenue, based on the regression results for the same year.

The regression results (as presented in Table 1) indicates that, on average, countries with a specific tax share above 70% collect €11 more cigarette tax revenue per capita. To calculate the total potential for each country, this per-capita effect was multiplied by the respective national population. This suggests that a higher reliance on the specific tax component is generally associated with higher revenues.

The results suggest particularly high potential in large EU member states such as Italy, Germany, and France. For example, Germany could generate an estimated €888 million in additional revenue, corresponding to 7.5% of current revenues. Across the EU, the potential ranges from 3.8% (Bulgaria) to 14.0% (Hungary), highlighting the significant untapped fiscal capacity that a stronger reliance on the specific tax component could provide. Summing across all countries, the total additional revenue potential for the EU amounts to approximately €4 billion. This estimate is derived by applying the average per-capita effect from the regression to the entire EU population. While actual effects are likely to vary across member states, the aggregated figure provides an indication of the order of magnitude of the untapped fiscal potential at the EU level.

It should be noted, however, that these figures represent average effects. The actual impact may vary by country, being stronger in some cases and weaker in others. Moreover, countries that already apply a specific tax share above 70% such as Sweden and Romania cannot expect further positive effects from increasing this share and therefore show no additional revenue potential. For better visibility, these countries are displayed in bold in the figure.

This difference in revenue highlights that the structure of taxation not only the rate can materially influence fiscal outcomes. This is further illustrated in Figure 7, which compares current tobacco tax revenues with the potential additional revenues that could be generated if all countries increased their specific ratio to above 70%. The chart shows considerable additional revenue potential in several large EU member states, particularly Germany, Italy, and Spain. Countries that already meet the 70% threshold are displayed in bold, highlighting the structural gap between high- and low-specificity systems.

This result highlights the importance of tax composition in determining revenue outcomes. Unlike ad valorem taxes, which are calculated as a percentage of the product's price and are therefore more sensitive to market fluctuations, specific taxes impose a fixed amount per quantity sold, offering greater stability. The observed revenue difference indicates that a higher reliance on specific taxation contributes to more predictable and stronger fiscal performance, particularly by limiting consumer substitution to lower-priced brands and reducing price-based tax erosion over time.

5.2. Conditional Effects: The Role of Indexation

Further analysis shows that the positive effect of a high specific share is not unconditional: it depends critically on whether the specific component is regularly adjusted over time, for example through indexation. The regression results supporting this finding are presented in Table 2. The model includes an interaction term between the specific rate and an indexation indicator, allowing the analysis to distinguish between revenue effects with and without adjustment mechanisms.

Table 2:

OLS Regression Estimates – Conditional Revenue Effects of Indexation

	Cigarette Excise Tax Revenue per Capita
Specific Ratio	-0.4243** (0.0371)
Specific Ratio * Indexation	0.4806** (0.0562)
Inflation	2.1168*** (0.0088)
NDP share	-1.5177*** (0.0000)
Country-Fixed Effects	Yes
Year-Fixed Effects	Yes

*This table reports the average slopes and p-values from yearly OLS regressions (Equation 2). *, **, *** denote significance at the 10%, 5%, and 1% level. For information on cigarettes excise tax revenues please see Appendix.*

The results suggest that simply increasing the specific share is not sufficient to improve fiscal outcomes unless it is supported by regular adjustments. Without indexation, increasing the specific share is associated with a decline in per capita revenues. In contrast, when specific taxes are indexed, each percentage point increase in the specific share leads to a positive revenue effect. Unlike the preceding analysis, which used a binary threshold to define high-specificity systems, this specification models the specific share as a continuous variable, allowing for a more granular estimation of marginal effects.

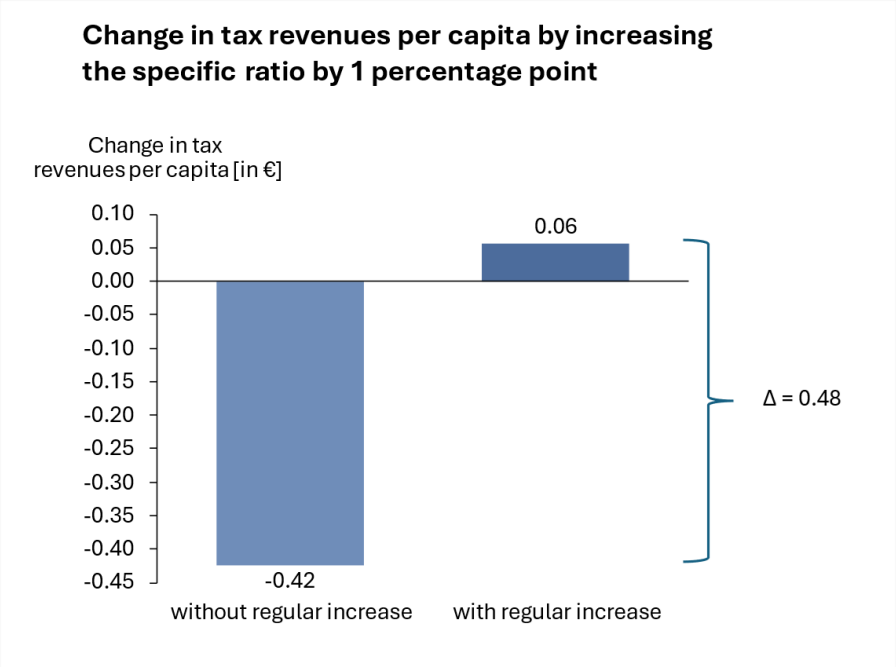

Figure 8: Change in Tax Revenues per Capita by Increasing the Specific Ratio by 1 Percentage Point – With vs. Without Indexation

Figure 8 visualises the estimated impact: in systems without indexation, a one percentage point increase in the specific share results in a decrease of €0.42 per capita, while systems with indexation see an increase of €0.06. This implies a differential effect of €0.48 depending on whether the tax is adjusted regularly. Scaled up, a 10-point structural adjustment could decrease or increase revenues by approximately €4.20 or €0.60, respectively.

This comparison shows that indexation not only preserves the value of the specific tax but is a necessary condition for ensuring its revenue-enhancing potential. The difference between these two scenarios (Δ = 0.48) highlights the importance of systematic indexation for maintaining the effectiveness of specific taxation.

These findings indicate that the benefits of structural reform toward greater specificity are contingent on maintaining the real value of the specific tax over time. Without such adjustments, the nominal value erodes under inflationary pressure, weakening its effectiveness and undermining fiscal performance.

This conditional result adds important nuance to the broader finding: a high specific share leads to improved revenue outcomes only when paired with systematic adjustments to sustain its real burden.

6. Discussion of results

6.1. Why Specific Excise Taxes Outperform

The results presented in the previous section reveal a robust empirical relation: countries with a higher reliance on specific excise taxes experience signifi-

cantly higher per capita tobacco tax revenues, particularly 11€ higher (or 7% higher) on average than countries with a low specific ratio. Summing across all countries, the total additional revenue potential for the EU if their specific ratio increases to over 70% amounts to approximately €4 billion (applying the average per capita effect to the entire EU population). This finding adds robust new evidence to the existing literature, which has long argued that specific taxation provides a more stable and predictable fiscal base. By leveraging a panel dataset covering 27 EU countries over more than a decade, the paper offers a rare empirical confirmation of this hypothesis using fixed-effects regression analysis. The results presented in this paper show that this advantage becomes particularly pronounced when specific tax rates are regularly indexed to account for inflation. As demonstrated, countries with a high specific ratio regularly increasing specific rates collect more revenue, averaging 0.60€ more per capita for every 10 percentual point increase in the specific ratio.

This section unpacks the mechanisms that drive these results, drawing on theoretical and empirical work to interpret the observed outcomes more fully. In doing so, it shows how the evidence provided here both reinforces and qualifies existing claims.

First, specific taxes offer greater predictability in revenue collection. Because they are levied as a fixed amount per quantity (e.g. per 1,000 cigarettes), they are independent on price fluctuations in the market. This has been consistently emphasized in the literature: Keen (1998) and WHO (2010) stress that specific taxation leads to more stable and less manipulable tax bases.

Second, specific taxes reduce price dispersion across brands, which limits consumers' ability to switch to cheaper alternatives in response to tax increases. Chaloupka et al. (2010) demonstrate that ad valorem taxes create wider price gaps across the market, encouraging down-trading and undermining the effective tax burden. This conclusion is echoed in more recent empirical work by Primorac et al. (2024), who find that specific-heavy excise structures are associated with both higher tax yields and greater price uniformity across cigarette brands. Thus, a specific tax compresses price differentials and discourages substitution, preserving revenue and reinforcing public health goals.

Third, specific taxes are generally easier to administer and harder to manipulate. Because they are not linked to the declared value or price of the product, they reduce the opportunities for under-reporting or artificial price setting. This is echoed in World Bank (2023), which highlights the administrative simplicity and enforcement advantages of quantity-based excise systems.

Fourth, regular adjustments or indexation of the specific component are crucial to maintain its real value over time. Without indexation, inflation erodes the purchasing power of the fixed tax, gradually weakening its effectiveness. This is widely recognized in international tax guidance (WHO, 2015; IMF, 2016) and is consistent with the regression findings presented in this paper: only when specific taxes are paired with indexation do countries consistently achieve positive revenue outcomes from structural reform.

Taken together, these empirically grounded mechanisms and established theoretical claims provide a strong economic rationale for why a specific-heavy tax structure, when properly maintained, performs better in fiscal terms than systems that rely more heavily on ad valorem taxation.

6.2. Policy Recommendations

Derived from the empirical findings, highlighting how tax structure and implementation mechanisms can strengthen revenue performance, the following policy measures are recommended:

1. **Adopt a predominantly specific tax structure:** Shifting excise systems toward a higher share of specific taxation can enhance government revenues without the need for raising overall tax levels. Countries with a high specific ratio, collect on average 11€ higher per capita revenue. Beyond stronger revenue performance, specific taxes also deliver more stable fiscal outcomes, as they are less sensitive to price fluctuations, and are more efficient to administer compared to ad valorem systems. This approach also reduces incentives for illicit trade, ensures fiscal predictability, and lowers administrative and enforcement costs. Furthermore, it delivers additional public health benefits, as raising the price of cheap cigarettes reduces their affordability, prevents consumer "downtrading," and contributes to lower smoking prevalence.

2. **Implement regular indexation of specific levels:** The effectiveness of specific tax systems depends on regular adjustment mechanisms, such as indexation. As presented, countries with higher specific ratio and regularly increasing specific rates average €0.60 more revenue per capita for every 10-percentage point increase in the specific ratio. These mechanisms help maintain the real value of specific taxes over time, enhancing their ability to generate stable revenues.

7. Conclusion and Directions for Future Research

This paper has analysed the impact of cigarette excise tax structure on government revenues across the 27 EU member states over a 15-year period. Using a fixed-effects panel framework, it compared the performance of specific and ad valorem taxation and assessed how design features such as indexation shape fiscal outcomes. The aim was to clarify whether greater reliance on specific excises enhances revenue stability and predictability, while also supporting public health objectives.

The evolution of the literature shows a clear shift from the early theoretical preference for ad valorem taxation (due to its pro-competitive effects) toward the recognition of specific taxation as the more effective and sustainable approach in the EU. Today, with stronger enforcement in place, excise tax policy is guided by three main considerations: fiscal stability, better health outcomes, and closer harmonization across Member States. These goals are most effectively supported by placing greater weight on specific taxation.

The empirical results show that countries with more than 70 percent specific excises collect about 11 euros more per capita in annual revenue. If all EU member states adopted this structure, the EU could gain an

additional 4 billion euros. Moreover, the positive effects are strongest in systems where specific taxes are indexed to inflation, underscoring that design features matter as much as overall levels.

While this paper provides robust evidence on the revenue effects of cigarette excise tax structure in the EU, it deliberately focuses on a specific analytical scope: fiscal outcomes. Several important questions lie beyond this focus and suggest promising avenues for future research.

First, the study does not address the behavioural implications of different tax structures. Future research could combine revenue data with smoking prevalence, consumption, or health indicators to better understand the full impact of tax structure reform.

Second, the treatment of indexation is intentionally simplified to capture the presence or absence of regular adjustment practices. This approach facilitates comparability across countries, but future studies could investigate variation in the strength, design, or automaticity of indexation mechanisms and how this affect revenue performance.

Third, the analysis is limited to the 27 EU member states, which share a relatively harmonized regulatory environment. It remains an open question whether the findings can be generalized to non-EU or lower-income settings with different market structures or institutional constraints. Expanding this line of inquiry to global contexts would be a valuable contribution.

Finally, this study does not explore the political economy of tax structure reform. While the empirical results point to the effectiveness of specific and indexed taxation, understanding when and why governments adopt such structures requires a different methodological approach.

In sum, this paper contributes new empirical insights on an underexplored but highly policy-relevant question. By clarifying the revenue effects of tax structure design, it opens the door to further interdisciplinary research that can assess the trade-offs, feasibility, and long-term outcomes of excise tax reform.

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PHILOLOGY

THE NORMATIVE PRINCIPLES AND THE RULES OF TRANSLATION

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DOI: 10.5281/zenodo.19364425

Abstract

General translation theory explains the concept of translation norms, which are used to evaluate translation quality. Translation linguistics includes both theoretical (descriptive) and normative sections. Theoretical sections of translation linguistics (i.e., linguistic theory of translation) examine translation as a means of interlingual communication, as an objectively observable phenomenon that can be described and explained. Normative sections of translation linguistics, based on theoretical studies of translation, formulate practical recommendations aimed at optimizing the translation process, facilitating and improving the quality of translators' work, developing translation evaluation methods, and training methods for future translators.

Keywords: translation, translators, machine translation.

Translation as a kind of spiritual human activity existed in the late antiquity and had always played an important role in the history of cultures of separate peoples and in the world culture in all nowadays. From the middle of the XX century (after the World War II) the translate activity in all its varieties acquired unprecedented scope thanks to growing intensively of international contacts. That's why our century is called the "Century of Translation". [1]

The history of translation acquaints us with the existence of two tendencies or two types two of transmission of foreign text, which perform quite contrast as regards to each-other. They are:

1) The translation which based upon the tendency of literal reproduction of the language of the original in damage of common sense and the language which is to be found translated.

2) The translation which is based on the aspiration to reflect the spirit, the sense of the original and to observe the demands of native language.

The example of the first type can serve some translation of the Bible to the Greek and Latin languages, and many other languages. The translation of the Arestotel's philosophy works and etc.

The second type of translation more often had been used in the works of secular character (Cicerone). Today translation has become one of the fastest-growing professions. This is because of the rapid rise of multinational businesses and of the use of electronic communication: the volume of translation texts (letters, contracts, emails, instruction manuals, books, computer software's promotional and training videos) has increased incredibly. These texts need to be translated.

Translators usually work from their second language into their native language. So, to be a good translator you should have an excellent command of your native language. [3]

As for machine translation there are some lacks. First of all MT is based only on structural linguistics. Undoubtedly MT from time to time requires additional correction. MT as we guess is implemented with the help of computer programmers. That's why it is just based on certain reserve of "memory" of the computer. As we know machine can neither think nor realize. It must be pointed out that computer performs only that sphere of job, which is laid in its memory by men. Here we see, translation is believed to be a complex phenomenon, touching upon the whole set of elements in both languages. As to machine translation there were some instances when the translation didn't tend itself to automatical process. Translation requires active work of mind, research for linguistic means, choice among possibilities of translation, high stylistic skills. All these cases approach to a highly professional level both in Simultaneous translation and Consecutive translation.

Variety meanings in translation

In semiotics we distinguish three types of meanings. In order to understand these meanings one must proceed from words because words are the bearers of meanings. For example, the word стол, masa (table) refers to a certain piece of furniture; the word (it), собака (dog) to a certain type of animal, etc. It is clear that not all the language signs (words) name things or living beings, but they refer also to actions and processes (as ходит-getmək, говорит-danışmaq), to qualities as болъной- xəstə, длинный-uzun, to such notions as причина, связъ- əlaqə as well. Subjects, processes, qualities; the phenomena of objective reality expressed

by language signs are called the referents of the signs, the relation between a sign and its referent is called the referential meaning (референционалъное значение-ilk məna). One most know that the referent of the sign is not a separately taken, single individual subject, thing, quality, process, but whole class of them. If a concrete thing, process, quality is meant, in this case we deal with denotation. For example, we may compare table as a piece of furniture and Отойди от стола-Masadan kənar dur. In the first sentence the table is a word with referential meaning, in the second it is denotation of the word table.

We use language, which is a system of signs, and we are not indifferent to these signs in the process of the communication. We express our subjective attitude to these referents expressed by the signs. We may compare Russian words башка и голова, глаза и очи, спатъ и дрыхнутъ, украстъ и сперетъ, baş və kəllə, gözlər və baxışlar, yatmaq və mürgüləmək, oğurlamaq və əkmək where the words express one and the same referents, but different subjective relations. These subjective (emotional, expressive, stylistic) relations are called pragmatic relations and the meaning – pragmatic meaning. [5]

One must not forget that not any sign exists in isolation; any sign functions as a component of a certain sign system. Therefore, any sign is in complicated and multifarious relations with other signs of sign system. For example, the Russian word стол and Azeri word masa is in definite relation with the words мебелъ-mebel, обстановка- düzülüş, стул-stul, кресло-yumşaq (qollu) stul,etc., in different types of relations with the words деревянный-taxta, круглый-dairəvi, накрыватъ-süfrə açmaq. The relation of a sign to other signs in the same sign system is called intralinguistic relations and the meaning-intralinguistic meaning.

The semantic structure of the sign is composed of three components-referential, pragmatic and intralinguistic meanings and they are all interconnected and interdependent. Which of these meanings are conveyed from the text of the SL to the text of the TL? First of all, the referential meaning for it expresses the accumulated experience of the whole language community to a less degree pragmatic meanings because, though we recognize one and the same thing in the same form, still subjective attitudes to them differ completely. The least transformable is the intra-linguistic meanings, it is because that in the process of transformation the intra-linguistic meanings of the SL are substituted with those of the TL. We even may speak of non-transformability of the intra-linguistic meanings. The transformation of these three meanings mainly depend on the type of the text. In the texts where we deal mainly with factual information the main attention is paid to transformation of the referential meanings, but in the text with conceptual information pragmatic meanings take the advantage.

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CONTRASTIVE STUDIES IN THE CONTEXT OF COMPARATIVE LINGUISTICS

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Abstract

Contrastive linguistics, a branch of comparative linguistics, emerged as a distinct field in the last quarter of the 20th century, developing its own objectives and methods for studying languages. Contrastive linguistics is characterized primarily by its narrower focus and high level of detail, focusing primarily on differences rather than similarities between languages, and primarily examining differences within just two languages. Furthermore, for comparison of a specific language pair, whether the languages are related or not is irrelevant. Contrastive linguistics also differs from other typological approaches in that it operates across a relatively broad range of linguistic structure.

Keywords: contrastive linguistics, goal of contrastive analysis, contrastive studies, theoretical and applied linguistics.

The term “contrastive linguistics” was formulated by Benjamin Lee Whorf in his article “Languages and Logic”, published in 1941. He drew a distinction between comparative and contrastive linguistics, arguing that contrastive linguistics would play a very important role in linguistic research, and defining it as a scientific discipline that “outlines the most important differences between languages in the areas of grammar, logic, and the general analysis of accumulated linguistic experience” [4, p. 240].

To conduct interlingual/intralingual and intercultural/intracultural comparisons in contrastive linguistics, most researchers use the term "contrastive analysis," although other formulations of this phenomenon can be found in the linguistic literature. For example, "parallel description of languages," "differential study of languages," "differential description of languages," "analytical comparison of languages," "interlingual comparison of languages," "descriptive comparison of languages," etc.

The goal of contrastive analysis is to compare linguistic and sociocultural data across a range of languages or individual languages in order to identify patterns, categories, and features that reflect the specificity of a particular language, as well as typological and/or universal patterns, categories, and features common to a range of languages. An integral part of contrastive research is the analysis of interlingual correspondences, which provides a better understanding of structural and functional divergence.

Early contrastive studies focused only on phonology, grammar, and vocabulary, and were therefore called micro-linguistic contrastive analysis [1, p. 61]. Here are examples of questions that needed to be answered in such an analysis:

– Which consonant phonemes in language X correspond to the consonant phonemes in language Y?

– How do they differ in composition, realization, and distribution?

– What is the system of grammatical tenses in languages X and Y?

Contrast analysis typically involves four steps:

description (the language structures selected for comparison are comprehensively described and analyzed according to the linguistic model chosen for this purpose);

selection of material for comparison (a decision is made about which aspects of the two languages will be compared, since it is impossible to compare everything at once in one study);

comparison (the process of contrastive analysis itself takes place, during which differences and similarities in the compared language systems are identified);

forecasting (explanations are given about which areas of the language being studied may encounter problems).

Many linguist researchers have their own views on how contrastive analysis should be conducted. For example, linguist K. James believes that the process of contrastive analysis consists of two stages: "the description stage, where each of the languages under consideration is described separately at a certain level, and the comparison stage, where the languages under consideration are compared" [1, p. 233].

In 1998, E. Chesterman proposed his own methodology for conducting contrastive analysis, arguing that the most objective information can be obtained through a continuous process of working on the problem. In his work, “Contrastive Functional Analysis,” he writes that contrastive analysis includes two main processes—description and comparison—which are implemented in four main stages: 1) data collection; 2) description of languages; 3) replenishment of data as needed; 4) presentation of the identified differences between languages [2, p. 52]. The description of the studied structures of the languages under consideration must be based on the same model in order to conduct an objective analysis. In this regard, E. Chesterman puts forward a detailed methodology for comparing languages:

1) collection of primary data, on the basis of which the proposed hypotheses should be tested. The initial information should include all cases of language use by people speaking the languages under study;

2) establishment of a criterion based on apparent similarity of any kind;

3) establishment of the nature of the comparison, the similarity of the preliminary hypothesis; and the formulation of a basis for it;

4) testing the hypothesis: determining the conditions for its acceptance or rejection. This process usually includes the selection of theoretical foundations, primary and additional material, the use of parallel corpora of texts, and analysis of errors and behavior of people speaking the languages under study;

5) formulation of a revised hypothesis;

6) testing the revised hypothesis [2, p. 68].

The undoubted task of a contrastive researcher is to create conditions under which the obtained results are justified. Depending on the comparison criterion, these conditions may be syntactic, semantic, pragmatic, stylistic, contextual, etc.

In his monograph “A Comparative Typology of English and German – Unifying the Contrasts,” the English linguist John Hawkins used a holistic approach to pairwise comparison of languages, attempting to identify the relationship between the characteristics of certain grammatical subsystems in order to find general principles explaining the existence of interlingual divergences. The object of his research was the English and German languages, which he examined “from a universal typological point of view” in search of “unified generalizations underlying the differences between significant subsystems of languages” [3, pp. 3-4]. Although J. Hawkins’s idea of a holistic approach to pairwise comparison of languages was not seriously used by other linguists, his research had a huge influence on the field of contrastive linguistics as a whole, defining it as a type of linguistic comparison that is self-sufficient in itself, without setting specific goals related to the study of a foreign language.

There are two types of contrastive studies: theoretical and applied. Theoretical contrastive studies provide a comprehensive and exhaustive analysis of the phonology, semantics, and syntax of the languages in question, provide suitable models for comparison, specify the elements to be compared, and the method for performing the comparison.

Applied contrastive studies are closely related to applied linguistics. They rely on the results of theoretical contrastive studies to provide a basis for comparing languages. They provide key information for teaching bilingual analysis and translation, diagnosing potential problems in acquiring the target language.

One of the key concepts of contrastive linguistics is the criterion of comparison. Before comparing languages, a linguist must determine what can be compared in the languages under consideration. Traditionally, there are three main approaches to approaching the problem of comparability. Initially, the criterion of comparison was established either at the semantic or grammatical level. The third method of establishing the criterion of comparison involves defining equivalence, similarity, and difference relationships in the languages under consideration.

The concept of "equivalence" came to contrastive linguistics from translation studies, where it implies translation equivalence. When establishing the level of equivalence between the categories being compared in the languages being compared, concepts such as "lack of equivalence," "equivalence," and "complete equivalence" are used.

When discussing equivalence in contrastive linguistics, it is assumed that there is a common denominator by which comparisons can be made. This denominator is called the tertium comparationis, which means "basis for comparison" in Latin, and is a prerequisite for any consistent study of similarities and differences between languages. In classical contrastive analysis, the basis for comparison can be found within either the formal or semantic approaches to comparison. In the former, similarity is established through formal correspondence, which traces how the form features of the source language text are reproduced in the target language. In the case of the semantic approach, however, judgments regarding structural similarity depend largely on translation.

Contrastive description of languages can be carried out at all levels of language structure: phonological, morphological, lexical, phraseological, syntactic, textual through the prism of structural and cognitive approaches.

Contrastive linguistics, which has established contrastive analysis as a distinct field, is currently gaining momentum. The scope and depth of its research is only growing, and the diversity of practical and theoretical approaches is impressive. Modern linguistic approaches and cutting-edge technologies have opened up new horizons and avenues for contrastive linguistics in the implementation of contrastive analysis.

Thus, it can be said that at the present time, contrastive linguistics reflects fundamental concepts of language that have changed over time, and the goals and objectives of research have been revised.

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THE GRAMMATICAL CHARACTERISTICS OF ADVERBS IN ENGLISH AND ROMANIAN: A CONTRASTIVE ANALYSIS

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Abstract

This paper presents a contrastive analysis of adverbs in English and Romanian, focusing on their morphological formation, syntactic distribution, and functional characteristics. Although both languages belong to the Indo-European family, they represent distinct branches—Germanic and Romance—resulting in both structural similarities and significant divergences. Drawing on major reference grammar, this study examines the points of convergence and divergence between the adverbial systems of the two languages. The findings indicate parallel morphological mechanisms, particularly in derivation, alongside notable syntactic differences regarding combinatory possibilities and sentence-level modification. Using a comparative methodology, the study establishes the degree of equivalence and distinctness between these categories and their means of expression. This investigation is supported by a corpus of translation examples from both literary and scientific texts, providing a practical basis for the contrastive analysis of these two distantly related languages.

Keywords: adverbial systems, contrastive linguistics, morphology, English grammar, Romanian grammar, derivation.

1. Introduction

Contrastive linguistics aims to identify structural similarities and differences between languages, regardless of their genetic relationship [13]. While traditional comparative philology concentrated on historically related languages, modern contrastive studies emphasize synchronic structural comparison [14]. Such research presupposes that languages share certain universal grammatical categories, even if these categories are realized differently. There has been a constantly growing interest in contrastive linguistics or linguistic confrontation. Sameness and similarity have always been the cornerstone of linguistic confrontation.

The comparative historical study of languages for many years was the unique and the only scientific method in linguistics. However, it gradually gave way to other methods and approaches. Nevertheless, the idea of comparing different languages remained as a guiding principle but the synchronic comparison implies a quest for altogether new sets of features and peculiarities.

For comparative philology these were always thought of as something that was genetically common, something that gradually diverged under the pressure of a variety of structural and extra linguistic factors. Analytical comparison continues seeking a method to compare languages across disparate families by identifying abstract features and distinctive linguistic markers.

Comparison in the widest sense of the word is carried out unless those carrying it out are convinced that there does exist a certain fundamental similarity between the two or more objects under investigation. If there were no underlying assumptions that all languages have something in common, the problem of confrontation simply would not exist.

Confrontational comparison has the advantage over comparative philology of being able to suggest a method which would be applicable to all languages irrespective of their history or possible genetic relationship. In this search we should confront some grammatical categories in English and their equivalents in Romanian. The two languages are distantly related. Comparison of related and unrelated languages is still widely spread but the methodology of their research must be further elaborated.

There is not enough attention paid to the adverbs while teaching English within practical classes at school and university, considering it to be an easy and not so important subject. English grammar is taught paying more attention to such parts of speech as verbs, nouns, pronouns, articles, prepositions, but paying less attention to the adverb as a part of speech which includes words qualifying an action or a quality or expressing various circumstances in which an action takes place. The adverb is usually only mentioned as ending in -ly when speaking about adjectives.

During English classes we have realized the difficulties and confusion that students sometimes encounter in making a difference between an adjective and an adverb. They often feel confused using the wrong word when writing sentences and while speaking. Besides there are some adverbs, the use of which is a real problem for the students. The dilemma is what and how to use: “good” or “well”, “bad” or “badly” and when. It is also important to know that some adjectives can also end in -ly, like the adverbs do. For example: “The friendly people welcomed to the neighborhood”.

So, the students must be taught the difference between adjectives and adverbs, i.e. figuring out the question of a modifier answers we are able to tell whether the modifier is an adjective or an adverb.

Nevertheless, some words can be either nouns or adverbs of time or place depending on how we use them in a sentence. For example, words like “yesterday”, “today”, “tomorrow” can function as nouns or as adverbs of time. Words that include “home”: “uptown”, “downstairs”, “outdoors” etc. can be both: nouns or adverbs of place.

The practical aspect of this article describes the characteristics of adverbs in Romanian, which also have their specific peculiarities. There are a great number of adverbs being different according to their origin and the way they are formed. As in English, the adverbs in Romanian have derived from adjectives, but in some cased nouns, pronouns even numerals can be used as adverbs. Thus, the adverb appears in both languages to be a part of speech which is tightly connected to almost all parts of speech, especially with adjectives, so that we have revealed numerous interesting aspects while studying the historical evolution of the English adverb as a part of speech. The study confirms the intrinsic link between the adjective and the adverb, focusing on the morphological derivation of the latter.

2. Theoretical Framework: The Adverb as a Grammatical Category

In English grammar, adverbs are traditionally defined as modifiers of verbs, adjectives, other adverbs, and occasionally entire clauses [9,12]. However, modern grammatical descriptions emphasize that “adverb” is not a uniform category but rather a residual class defined partly by distributional criteria [12]. We may distinguish between:

- Adjuncts
- Disjuncts
- Conjuncts

This functional classification highlights the role of adverbs at both clause and sentence level [17].

In Romanian grammar, the adverb is defined as an invariable part of speech expressing circumstances or characteristics of actions and states [2,7]. Like English adverbs, Romanian adverbs are morphologically invariable, though some admit degrees of comparison.

3. Morphological Formation of Adverbs

English adverbs may be classified morphologically as:

1. **Simple adverbs**: *now, here, then, well*
2. **Derived adverbs**: typically, with the suffix *-ly*
3. **Compound adverbs**: *sometimes, somewhere*
4. **Adverbial phrases**: *at least, at last* [8,17]

The suffix *-ly* is the primary productive marker of adverb formation in English. It attaches mainly to qualitative adjectives [16]. For example: *quick → quickly; serious → seriously*

According to [4], the suffix *-ly* historically derives from Old English *-lic*, which also produced adjectival forms. This explains why some words ending in *-ly* are adjectives rather than adverbs (e.g., *friendly*, *daily*). Corpus-based research further demonstrates that *-ly* adverbs vary in frequency and register distribution [6].

Certain words can be either adjectives or adverbs, depending on the way we use them in a sentence. To decide whether a word is an adjective or an adverb one should consider the word it defines or modifies. If the modified word is a noun or a pronoun, the modifier is an adjective. If the modified word is a verb or an adjective, then the modifier is an adverb.

e.g. Hilda likes hard candy.

(The adjective “hard” describes the noun “candy”)

e.g. Hilda bit hard on a candy.

(The adverb “hard” tells how Hilda bit into the candy)

Other words that can be either adverbs or adjectives include: “well”, “early”, “long”, “late”, and “low”.

Many words end in -ly but so do some adjectives:

e.g. The actor performed brilliantly in the play. (Adverb)

e.g. Friendly people welcomed us to the neighborhood [15]. (Adjective)

Thus, in the second example one can notice that even though “friendly” end in -ly it is an adjective.

Alternatively, if one can figure out which question a modifier answers, it can tell whether the modifier is an adverb or an adjective.

Adjective:	**Adverb:**
1. Which 2. What kind (of) 3. How many	1. How or in what manner? 2. When? 3. Where? 4. How often? 5. To what extent or degree?

e.g. Is that a daily newspaper?

Analysis: “Daily” modifies “newspaper” which is a noun. “Daily” tells what kind. Therefore “daily” is an adjective.

e.g. We bake our bread daily.

Analysis: “Daily” modifies “bake” which is a verb. “Daily” tells how often. Therefore “daily” is an adverb.

Many doubts are expressed sometimes to “good” and “well”, “bad” and “badly”.

“Good” and “bad” are always adjective. “Badly” is always and adverb. “Well,” can be an adverb of manner, as it can be noticed in the following example:

e.g. He drove well. (meaning skillfully)

But “well” can be also an adjective:

e.g. He is well [15.] (meaning “in good health”)

The following chart shows the different uses of each word:

	Good	Well
Adjective (after linking verb)	e.g. I feel good. (in good health, healthy) e.g. I look good at that. (well dressed)	e.g. I feel well. (in good health, satisfactory)
Adverb (after action verb)	-	e.g. I play well. (how, the way I play)

	Bad	Badly
Adjective (after linking word)	e.g. I feel bad. (in poor condition; sad) e.g. I look bad. (in poor health)	-
Adverb (after action verb)	-	e.g. It hurts badly. (how, the way it hurts)

To summarize, the correct application of these terms is predicated on the syntactic function of the verb within the clause. The selection of a modifier—whether an adjective or an adverb—is not arbitrary but rather strictly dictated by whether the verb establishes a state of being or describes a dynamic action.

4. Noun or Adverb

Some words can be either nouns or adverbs of time or place, depending on the way they are being used in a sentence. Words like "yesterday", "today", "tomorrow" can function as nouns or adverbs of time. Words that can be both nouns and adverbs of place include: "home", "uptown", "downstairs", and "outdoors".

Noun	Adverb
e.g. Yesterday was eventful. e.g. Today is a holiday. e.g. The great outdoors is beautiful.	e.g. We were busy yesterday. (adverb of time) e.g. We will celebrate today. (adverb of time) e.g. Children must play outdoors. (adverb of place) [15]

The words "not" and "never" are negative adverbs. They tell what extent (not at all) and when (never).

e.g. The last goal did not count.
("not" modifies "did count")
e.g. Lance will never go camping.
("never" modifies "will go")

Other negative words are *nowhere, hardly, only*.

One should also consider the following two main rules when dealing with negative words to avoid errors with adverbs:

Rule 1. Ordinarily do not use two negative words (a double negative) in the same clause. There should be one negative used only to express the idea of a negative.

Not **But**	I ~~never~~ ate ~~none~~ of that fudge. I <u>never</u> ate <u>any</u> of that fudge.
Not **But**	They do ~~not~~ have ~~brownies~~. They do <u>not</u> have <u>any</u> brownies.

Rule 2. Place adverbs of degree as close as possibly to the words they modify. Misplaced adverbs make a sentence confusing:

Not **But**	He has ~~almost~~ completed all his chores. (Has he not finished any of them?) He has completed <u>almost</u> all his chores. (he has finished most of them)

Thus, the rules governing negation and adverb placement are essential for maintaining both semantic consistency and structural integrity in English composition. Ultimately, these conventions serve to eliminate ambiguity, ensuring that the reader interprets the text exactly as the writer intended.

5. Adverbs in Romanian

Some languages, either because of genetic identity or because of certain socio-linguistic, historic and other circumstances, are readily confronted, while others are not. It is easier to translate a text from English into French and Romanian, than from English into Chinese or Arabic. The obvious reason here being the much greater affinity between English, French and Romanian, than between English and Chinese or other unrelated languages.

Thus, the classification of adverbs from the two languages under study (English and Romanian) was confronted altogether with the degrees of comparison

of adverbs, the negation as a phenomenon and finally the syntactical functions in both languages.

We must begin with the definition of the adverb: "The adverb is an inflexible part of speech which expresses a characteristic of the action or state (merge repede; doarme afară; s-a oprit aici) [2].

The adverb is first a verbal determiner. Except the verb, the adverb in Romanian may determine an adjective (puţin urâtă; problemă foarte grea), a noun (scrisoare de acasă), a pronoun (cei de acolo), a numeral (*în*că doi), or an interjection (ei bine; hai *în*năuntru).

It is evident that the adverbs in Romanian can modify even interjections and numerals, while according to the definition given in [9,13], adverbs can modify only verbs, adjectives or another adverb.

It is also important to note that in Romanian there are adverbs that are themselves sentences. For example: "da" and "nu" or predicative adverbs like "bine*în*ţeles", "desigur", "fireşte". Some adverbs "chiar", "tocmai", "nu numai", "poate" give an additional meaning to a whole sentence or only to a part of this sentence:

e.g. Tocmai azi dimineaţă am sosit de la Florenţa.

e.g. Poate demult s-a stins *în* drum.

e.g. În depărtări albastre [2].

In comparison with other parts of speech, the adverb in Romanian and English is inflexible, which means it does not have declination, it is not conjugated and does not change its genre. Some adverbs have degrees of comparison, like adjectives, also expressed analytically with the help of auxiliary words.

6. Morphological classification of adverbial systems

Taking into consideration the origin and formation of the English and Romanian adverb we have noticed that in many aspects the adverbs of the two languages, i.e. their principles of the morphological classification coincide.

Some grammarians [8] suggest that according to the form of the adverbs in English may be classified as follows:

a) Simple adverbs which have no ending show that they are adverbs. For example: here, how, then, now, quiet, still.

b) Derived adverbs formed from other parts of speech by composition. For example: sometimes, somewhere, midway [8,17].

Most adverbs are derived from qualitative adjectives by means of adding the suffix "-ly". For example: slowly, quickly, seriously, actively etc.

Much rare adverbs are formed by the addition of the suffix "- ly" to the stem of:

1. participles (inquiringly, meaningly, decidedly)
2. nouns (partly, bodily)

c) Phrase adverbs formed from nouns with prepositions (phraseological units). For example: at last, at least, one by one, to and from etc.)

d) Combinations of an adverb with preposition such as till, now, since, then, from, where, from within etc.)

Having analyzed the classification of adverbs according to their origin and formation presented in [5], and having studied the classification of the Romanian adverbs, while taking into consideration the same principles used for the classification of the adverbs in English, we have come to the following morphological classification:

a) Simple adverbs, i.e. those which have no specific ending (acum, agale, atunci, deja, aici, poate etc.)

b) Derived adverbs formed from other parts of speech (bărbăteşte, haiduceşte, omeneşte etc.) So, as most adverbs in Romanian derived from qualitative adjectives by adding the suffixes: "-eşte" and "-iceşte". For example: nebuneşte, moldoveneşte, părinteşte etc.

c) Compound adverbs, those combined with other words:

1. nouns (mâine seara, ieri noapte)
2. prepositions (de-abia, de dinainte, până acum)
3. adverbs (oarecum, orişicum, oriunde) [5,7].

In conclusion, the morphological classification of Romanian adverbs into simple, derived, and compound forms demonstrates a clear and systematic structural organization. The productivity of derivational suffixes such as *-eşte* and *-iceşte* highlights the close relationship between adjectives and adverbs, while the existence of compound formations illustrates the flexibility and richness of adverbial expression. This framework not only clarifies the internal mechanisms of Romanian adverb formation but also supports meaningful comparison with corresponding structures in English.

7. Conclusions

To sum up, the adverb constitutes a complex and multifunctional grammatical category in both English and Romanian. Although both languages employ productive derivational mechanisms and analytic comparison, Romanian exhibits greater syntactic flexibility and different negation patterns. Since the adverb does denote qualifications of the second order, not of the first one, like adjectives, it includes a great number of semantically weakened words which are in fact intermediate lexemes by their status and often display features of pronominal nature both in English and Romanian.

Furthermore, the morphological classification of adverbs in English and Romanian is similar in the following points:

1. There are simple adverbs in English and Romanian, and they even coincide (in English: here, in Romanian: aici)
2. There are derived adverbs formed from different parts of speech in both languages.
3. In both languages a suffix (suffixes) is used to denote some adverbs. (In English "- ly", in Romanian "-eşte, -iceşte")

Finally, in both languages, adverbs may appear in combination with adjectives, nouns, prepositions, and participles; however, Romanian adverbs also display the capacity to combine with verbs, a feature that does not characterize the English adverb to the same extent. Therefore, while certain structural differences can be identified, the overall comparison highlights substantial parallels between the two languages.

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SOCIAL SCIENCES

SUBJECTIVITIES IN RESISTANCE: THE NATIONAL THOUGHT OF INDIGENOUS AND AFRO-DESCENDANT WOMEN IN 20TH-CENTURY EL SALVADOR

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Abstract

This study analyzes the intellectual and political contributions of Afro-descendant and Indigenous women in El Salvador during the 20th century, focusing on a nationalistic ideology that challenged the myth of state racial homogeneity. The aim is to highlight their agency and resistance in the face of invisibility. Through a systematic approach, employing a methodology of historical revisionism and qualitative analysis of archives and oral testimonies, this research examines how these women integrated social justice with the preservation of cultural identity. The findings indicate that they were not only guardians of collective memory but also articulated discourses of sovereignty from spaces such as confraternities and markets, exercising fundamental leadership in the face of authoritarianism. In conclusion, their historical significance transcends borders by personifying the intersectionality of race, class, and gender in Latin America. Their legacy constitutes an act of re-existence that challenges the foundations of the nation-state and enriches the understanding of regional plurality, consolidating themselves as pillars of an inclusive Latin American identity that recognizes diversity as the basis of its historical trajectory.

Keywords: women, Afro-descendants, indigenous people, El Salvador, identity.

Introduction

The identity of Black women on the continent is not defined by lack, but by Afro-Americanness, understood as a process of active resistance and cultural creation. Being an Afro-Latin American woman does not imply inhabiting a place of historical passivity, but rather becoming a driving force behind a heritage that has transformed language, society, and politics. Essentially, it is an exercise in sovereign existence that reclaims its own voice in the face of external narratives (González, L. 1988).

In the case of El Salvador, the study of national thought has historically been linked to the homogenizing narrative of mestizaje, which renders ethnic and racial particularities invisible. This research aims to highlight the political and intellectual agency of Indigenous and Afro-descendant women during the 20th century, analyzing how their discourses challenged the structure of the nation-state. The relevance of this work lies in documenting the forms of symbolic resistance following the 1932 ethnocide, an event that marked a transition toward a national identity that denied otherness (Lara-Martínez, 2011).

According to Santacruz Giralt (2019), prioritizing the recognition of women's contributions allows us to validate their role as active subjects in shaping cultural, political, and historical context. This approach seeks to transcend the narrative that positions them exclusively as victims of patriarchal structures. While acknowledging historical oppression, a perspective focused solely on victimization tends to render invisible women's agency and impact, particularly in environments marked by inequality and violence.

Ethno-racial identity, therefore, should not be understood as a static state or a simple label of belonging. It is a dynamic phenomenon that develops in constant interaction with historical transformations and the social context. As Hall (1992) points out, this identity is not an immutable or natural trait of the individual, but rather a continuous construction that is shaped and transformed according to the cultural frameworks and social representations of their environment.

In this sense, the research focuses on analyzing the subjectivities of resistance among Indigenous and Afro-descendant women in El Salvador, recognizing their contributions to the construction of alternative discourses to the official narrative of mestizaje (racial and cultural mixing). The methodological approach is based on a historical-critical perspective, which allows for the articulation of collective memories with contemporary theoretical frameworks on identity and gender. In this way, the aim is not only to document previously invisible experiences, but also to reframe them as an essential part of the nation's formation and the processes of social transformation (Hall, 1992; Santacruz Giralt, 2019; Lara-Martínez, 2011).

Methodology:

The research was conducted using a qualitative approach, grounded in historical revisionism and content analysis. This perspective allowed for an intersectional examination of the experiences of Indigenous and Afro-descendant women, considering the convergence of gender, ethnicity, and class in their life trajectories.

Methods and techniques:

Historical revisionism: This was applied to reinterpret national processes from the perspectives of subaltern voices, questioning official narratives that rendered women's participation invisible (López Bernal, 2014).

Content analysis: This was used to identify discursive patterns and representations in the reviewed documents, allowing for the establishment of categories of resistance, political agency, and cultural sovereignty.

Regional comparison: The analysis of Garifuna women's experiences in the Caribbean was included as a comparative framework, enriching the transnational

understanding of women's resistance (Pérez Gamón, C. 2025).

Materials used:

Specialized bibliography: academic works that support the critical analysis, including the studies by Santacruz Giralt (2019), Vásquez Monzón (2020), Herrera (2018) and Sierra Becerra (2013).

Investigation:

Reconstructing the history of women in El Salvador is not simply an exercise in compiling biographical data, but rather a proposal for transforming the production of knowledge. Following Michelle Perrot 's (2008) arguments, feminist activism has generated two "knowledge effects," or cognitive advances, that are fundamental to this field of study. The first refers to the work of memory, consisting of rescuing traces and preserving archives that make women visible in historical development. The second, of a deeper nature, implies a desire for epistemological rupture. This rupture seeks to deconstruct established knowledge that has systematically ignored the female presence, questioning the structures that determine what is considered "official history."

In this sense, Salvadoran historiography has operated under what López Bernal (2014) defines as the "political uses of the past." According to the author, history is not a neutral record, but rather a tool for national cohesion used by the State to legitimize a specific order. In El Salvador, this translated into a narrative that prioritized military feats and the consolidation of mestizo identity, relegating to oblivion any subjectivity that questioned the unity of the nation-state. Therefore, the invisibility of women was not an accidental omission, but a political strategy to maintain a patriarchal and exclusionary power structure. Thus, the need to write a history of women from their own experiences responds to a structural deficiency in the country's official narrative.

However, as Santacruz Giralt and Vásquez Monzón (2024) explain, an analysis of the 20th century reveals that women constituted a critical "flux" that fueled currents of thought and social transformation. This perspective demands recognizing women not only as victims of patriarchal systems, but fundamentally as agents with the capacity to influence culture and politics. According to Santacruz Giralt (2019), an excessive emphasis on victimization tends to negate agency, especially in contexts of precarity and violence, making it imperative to validate their achievements and contributions as defined political subjects (Sierra Becerra, 2013).

This rescue effort is complemented by Hernández's (2018) perspective, which highlights that the everyday resistance practices of Indigenous and Afro-descendant women were not mere footnotes in history, but rather processes that articulated cultural survival in the face of the state's homogenizing model. By questioning why these trajectories have been historically relegated, the research takes up Sierra Becerra's (2013) challenge: to recognize women as political subjects with their own agency, capable of shaping society even from within the spaces of precarity and inequality imposed by the patriarchal system.

The context in which these resistance movements arose was marked by an oligarchic agrarian structure and a succession of military regimes. Following the 1932 peasant uprising, the Salvadoran state implemented aggressive policies of cultural assimilation. This survival mechanism forced Indigenous and Afro-descendant populations to abandon their languages, clothing, and customs to avoid state repression. In this environment of authoritarianism and the search for a single national identity, women faced double exclusion: state-ethnic exclusion and that imposed by the gender roles of the time. The exclusion of women from the concept of citizenship in the 1886 Constitution is a clear example of how the Salvadoran state was built on a logic of "abstract inclusion and concrete exclusion" (Vásquez Monzón, 2020, p. 143). While legal discourse spoke of citizens in general terms, institutional practice segregated women, indigenous people, and Afro-descendants from decision-making spaces, consolidating an exclusionary and patriarchal model of nation.

Within this landscape of exclusion, Prudencia Ayala emerges as a foundational figure. Her presidential candidacy in 1930, at a time when women did not even have the right to vote, represented a direct challenge to the power structure. Vásquez Monzón (2020) points out that Ayala, being an Indigenous woman and illiterate by the standards of the time, exposed the limitations of the Salvadoran republican ideal. Her "imprudence" was not an isolated act, but a political gesture that forced state institutions to discuss the status of women as a prerequisite for a true democracy.

Ayala in 1920

Castillo, I. (October 2, 2020).

Ayala's political program was remarkably advanced for its time, as it explicitly stated the need to recognize national sovereignty in both sexes, affirming that " *the female element will in fact obtain the political right to identify the sovereignty of the Nation in both sexes* " (Vásquez Monzón, 2020, p. 147). This proposal sought not only suffrage, but a complete redefinition of the nation from the perspective of Indigenous and Afro-descendant women, who had historically been the most marginalized stratum of Creole power.

A critical aspect in the formation of national thought has been the deliberate denial of African heritage. In the Salvadoran collective imagination, it has been erroneously maintained that "there has never been a population of African descent" (Erquicia & Herrera,

2017, p. 14). This invisibility served the official discourse of mestizaje, which sought to homogenize the population under the category of a "white mestizo" nation, concealing the Black and Indigenous roots that did not fit into the liberal civilizational project.

However, historical research reveals that Afro-descendant women forged interethnic bonds as early as the 16th century, using marriage and procreation as spaces of resistance to guarantee the freedom of their descendants (Erquicia & Herrera, 2017). These everyday practices constitute a form of "resistance from below" that challenged colonial and republican hierarchies. Nineteenth-century modernization, understood as the process of "ceasing to be Indigenous, Black, or mulatto" to become a citizen, failed in its attempt to erase these identities thanks to the forms of community resistance that women maintained, which today form a constitutive part of the national memory (Hernández, 2018).

The study of subjectivities in resistance in El Salvador is enriched by engaging with other experiences in the region. Pérez Gamón C. (2019) analysis of Garifuna women in the Caribbean offers a valuable comparative framework. Like Afro-descendant women in El Salvador, Garifuna women have been fundamental in preserving collective memory and transmitting ancestral knowledge in the face of racial and cultural marginalization.

This regional perspective allows us to understand that the struggles of Salvadoran women were not isolated events, but rather part of a transnational network of female resistance that challenged the colonial and patriarchal order throughout Central America. Both Ayala's "imprudence" and the community practices of Afro-descendant and Garifuna women demonstrate that national thought is not an exclusive construct of the elites, but a product of subaltern voices that project horizons of plurality and inclusion.

Results and Discussion:

The research findings reveal a structural tension in the formation of the Salvadoran nation-state in the 20th century. While the official narrative promoted a homogeneous model of national identity, based on the "political uses of the past" (López Bernal, 2014), Indigenous and Afro-descendant women articulated forms of resistance that challenged this hegemony.

A. Spaces of Covert Resistance and Cultural Sovereignty

One of the most relevant findings is the identification of confraternities and markets as sites of unconventional political resistance. These spaces, far from being merely economic or religious, functioned as platforms of cultural sovereignty, preserving identity traits that the State sought to homogenize under the project of "white mestizaje" (Erquicia & Herrera, 2017). According to Herrera (2018), women acted as custodians of collective memory, guaranteeing the continuity of cultural practices in the face of assimilation policies.

B. Redefining "Salvadoran Identity" and Community Leadership

The results show that these women's national thinking was not oriented toward segregation, but rather toward an inclusive redefinition of national identity. Their community leadership was decisive in creating rural solidarity networks, fundamental for supporting populations in crisis situations. This finding positions women as active political subjects, capable of transcending the domestic role assigned by patriarchy and projecting a vision of social and territorial justice.

C. Political Agency and Epistemological Break

The research confirms that women managed to move from everyday resistance to public influence. Prudencia Ayala's candidacy in 1930 constitutes a milestone that challenged the "abstract inclusion" of the 1886 Constitution (Vásquez Monzón, 2020). This political gesture represented an epistemological break (Perrot, 2008), demonstrating that national sovereignty had to be binary to be legitimate. In this sense, the thesis of Sierra Becerra (2013) is validated, who argues that women should be recognized as architects of proposals for a more just and diverse nation, and not merely as victims of patriarchal structures (Santacruz Giralt, 2019).

Interpretation and Comparisons

Everyday Resistance and Collective Memory: The community practices of Afro-descendant women in El Salvador resonate with regional experiences, such as those of Garifuna women in the Caribbean, who also preserved ancestral knowledge in the face of racial marginalization (Pérez Gamón, C. 2025).

Identity Plurality: The findings reinforce the idea that "Salvadoran identity" is not an exclusive construct of the elites, but rather the result of subaltern voices that project horizons of inclusion.

Women's Political Agency: The figure of Ayala demonstrates that women's participation was not marginal, but central, in the discussion on citizenship and democracy in El Salvador.

The research establishes that Indigenous and Afro-descendant women not only resisted the systematic invisibility imposed by the State, but also built alternative national identities from the margins. Their contributions consolidate a pluralistic identity that recognizes diversity as the foundation of Latin America's historical trajectory. Ultimately, their legacy constitutes an act of re-existence that enriches the understanding of democracy and cultural sovereignty in the region (Herrera, 2018; López Bernal, 2014; Vásquez Monzón, 2020).

Final reflection and conclusion

The research concludes that the participation of Indigenous and Afro-descendant women in shaping Salvadoran national identity transcended victimization, consolidating itself as an active political and cultural force. It establishes that the systematic invisibility imposed by the State, through homogenizing discourses of mestizaje and policies of assimilation, failed to erase subaltern subjectivities. On the contrary, these women operated from the margins, using spaces such as religious brotherhoods and markets to exercise covert political resistance and safeguard a cultural sovereignty that the liberal national project sought to extinguish (Herrera, 2018; López Bernal, 2014).

Furthermore, it is concluded that women's resistance inextricably linked the preservation of identity with the pursuit of social justice. This is evident both in the formal-institutional dimension, represented by the

epistemological rupture of Prudencia Ayala's candidacy and her demand for a binary citizenship (Vásquez Monzón, 2020), and in the community-territorial dimension, manifested in the management of rural solidarity networks. These findings demonstrate that these women's thinking was not segregationist, but rather proactive, projecting a pluralistic " Salvadoran identity " based on the recognition of ethnic diversity and gender agency.

Ultimately, the historical significance of these women transcends Salvadoran geography, becoming embedded in the collective memory of Latin America. By personifying the struggle against invisibility, their symbolic legacy becomes a benchmark of regional plurality and a fundamental critique of the foundations of the monocultural nation-state. Their relevance lies in having proposed an inclusive identity that recognizes diversity as the true basis of Latin American history, enriching the understanding of democracy and cultural sovereignty on the continent. Thus, the reconstruction of this historiography not only completes the record of events but also constitutes an essential cognitive advance for deconstructing traditional knowledge and proposing more just horizons of coexistence (Perrot, 2008).

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VOL.1

№112/2026

Znanstvena misel journal

The journal is registered and published in Slovenia.

ISSN 3124-1123

The frequency of publication – 12 times per year.

Journal is published in Slovenian, English, Polish, Russian, Ukrainian.

The format of the journal is A4, coated paper, matte laminated cover.

All articles are reviewed

Edition of journal does not carry responsibility for the materials published in a journal.

Sending the article to the editorial the author confirms it's uniqueness and takes full responsibility for possible consequences for breaking copyright laws

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